SBC6045 User Manual

Rev. 1.1

Release: 2010-11-02

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Revision record

Date	Revision Version	CR ID/Defect ID	Section Number	Change Description	Author
2010-6-30	1.0				
2010-10-28					

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Chapter one: Overview

1 System Overview

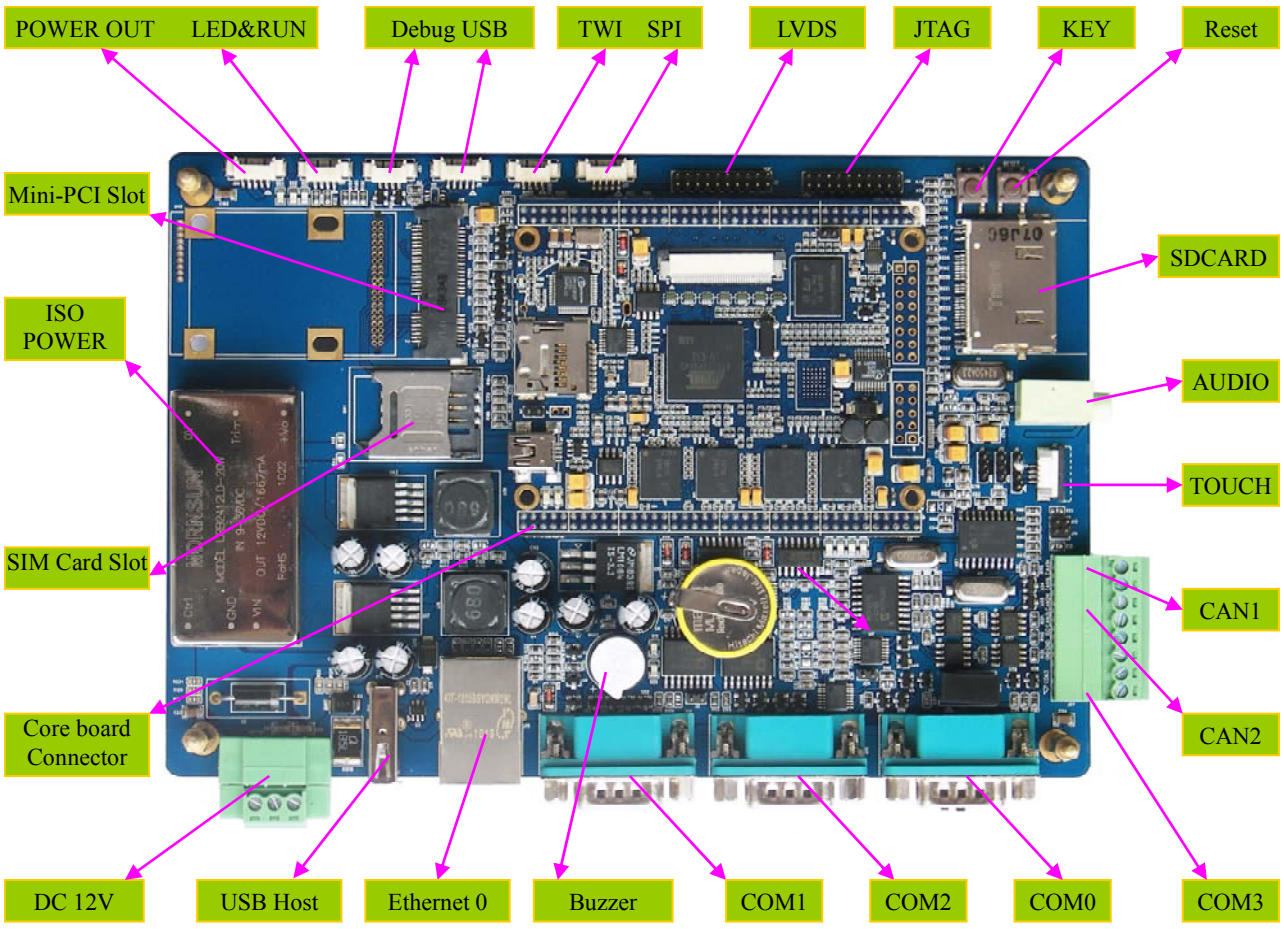
Embest SBC6045 is a high-performance ARM embedded single board computer (SBC) provided versatile communication interfaces to meet a wide variety of applications such as industrial control, automation, equipment monitoring, data logging, medical equipment, embedded web server etc. It is based on the 400MHz Atmel AT91SAM9G45 microprocessor and features wide input range from 12V to 36V with isolated power.

The SBC6045 board uses Mini6045 processor card as the CPU core board which has 256MB (2*128MByte) DDR2 SDRAM, 256MB Nand Flash, 4MB Data Flash, 2Kbit EEPROM and integrates UART, Ethernet, USB OTG, LCD, Touch screen, RTC and TF card slot on board. It connects to the expansion board through two 2.0mm pitch 80-pin connectors which enables the expansion board to access to all the core board's I/O through on-board connectors. The SBC6045 also has expansion blocks such as CAN and SD card slot as well as a Mini-PCI slot and SIM card slot which has integrated UART and USB signals. Customer can attach 3G module, GPRS module and other Mini-PCI devices to this interface.

The board is capable of supporting Linux 2.6.30 open source operating system. Embest provides BSP package, user manual and some other tools and documents to help customer with their development. It would be a stand along platform ideal for your evaluation and early development work. It can be also used directly for your next product design.

Chapter Two: Hardware system

2 Specifications of hardware



SBC6045 consists of three parts：

- Main board
- core board
- LCD module 4.3inch 480*272（optional）
- LCD module 7.0inch 800*480（optional）

2.1 CPU

Pocessor:T91SAM9G45，ARM926EJ-STM ARM

AT91SAM9G45 chip applies an ARM926EJ-S core with MMU function, which comprises a 64KB internal SRAM and a 64KB internal ROM,2 external bus interfaces. It can coordinate 4 Pieces DDR2/LPDDR,or 4 Pieces SDRAM/LPSDR，otherwise 4 Static Memory,or in the term of the same number of CF Flash Memories, SLC NAND Flash with ECC checking ability.

AT91SAM9G45 combinates the function of User Interface and High Speed Data Connection together, such as LCD controller, Resistance Touch Screen, Camera input, Audio input, 10/100M

Ethernet,High speed USB, SDIO and so on. AT91SAM9G45 provides user with outstanding experience through outstanding Internet and local memory media,operating at 400MHz and a number of external devices working at more than 100Mbps.

AT91SAM9G45 play the latest DDR2 and NAND flash memory interface for program and data storage. With a 133M internal multilayer bus interface of 37 DMA channels relative, a dual external bus interface,and a 64K byte distributed EMS memory which can deploy TCM, the necessary bandwidth for maintaining the communication between Processor and High spped external device is achievable. AT91SAM9G45 efficient power management controller clock gating and battery backup part, AT91SAM9G45 power management controller in the power and standby mode reduces the power consumption to a minimum.

2.2 Core board functions

CLASS	FUNCTION	PARAMETER
Pocessor	CPU	Atmel AT91SAM9G45, ARM9,400MHz
Memory	DDR2	64MB*2*2
	NandFlash	256MB
	DataFlash	4MB
	EEPROM	2Kb
	TF CARD	A TF card interface
LCD	LCD	FPC connector leads out 3 output,in a 24-bit LCD interface,touch screen interface,And the LCD interface,LVDS interface,leads
Others	LED	An LED system status indicator, the other is for the POWER status indicator
	Extended RTC	Extending an accurate RTC via the DS3231
	Network	System produces a 100M network interface
	USB	Extending a USB 2.0 OTG interfaces through the MINI USB connector
	UART	Output RS232 voltage, leads out DEBUG interface
	Other IOs	Other interfaces come out through 160PIN 2.0mm double straight pin

Core board size：67*82mm

The main connector : (80PIN double Straight pin) * 2 2.0mm interval

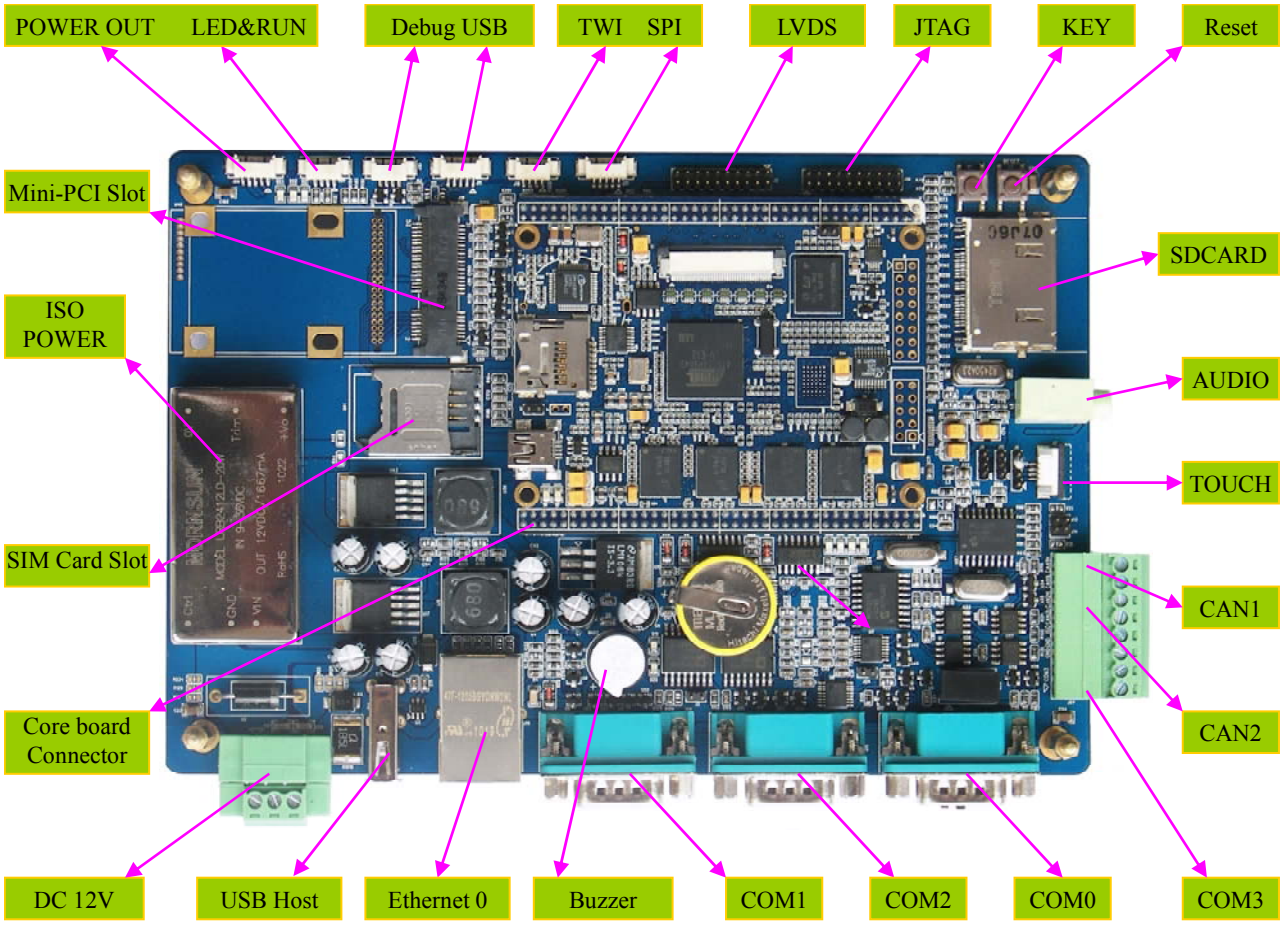
The specific pin definition please refer to ： 3 、System Electrical Note

2.3 Functional interfaces of main board

CLASS	FUNCTION	PARAMETER
Storage	SD card	High-Speed SD Card interface supports hot-swappable
Power	Isolated powe	Wide voltage range of 12 ~ 30V, 12V power input defaultly
		DEBUG：RS232 3 wire
		COM0：RS232/RS485 (Isolated) 3- lines

		COM1：RS232 5 wire
		COM2：RS232/RS485 (Isolated) 3 - lines
		COM3：RS232/TTL 3 wire
	CAN	2 CAN2.0 communication interfaces get power and isolate signal by two SPI expansion
	NET	MCU internal built-in controller, 10/100Mbps port with indicator
	USB Host	1xUSB2.0 Host controller supports USB keyboard, USB mouse, etc..
	USB	1x USB2.0 OTG controller
	TWI1	Maximum 400Kbps, to support master-slave mode, comes out in the form of wire connector
	SPI1	Wiring connector mode leads out
LCD	LCD Interface	CPU supports a maximum resolution of 1280 * 860 pixel, 24/16 bit RGB color mode, the current 4.3,7-inch screen matching well, supports 24-bit LVDS interface output
Input /Output	TOUCH	4-lines resistance touch screen interface
	Audio Out	Support MP3 Play
Panel	Buzzer	A controled BUZZER by GPIO
	JTAG	Standard JTAG Interface 20PIN 2.0mm
	KEY	A GPIO button, a RESET button
	Indicator	Wiring connector leads to power and system status IO, useful for indication of system status on shell
	LED	Onboard power and IO status indicator
Others	RTC	Onboard rechargeable coin cell power supply for RTC
	Special Power Supply	Wiring connector leads to 12V power supply output, switch, backlight and power supply management

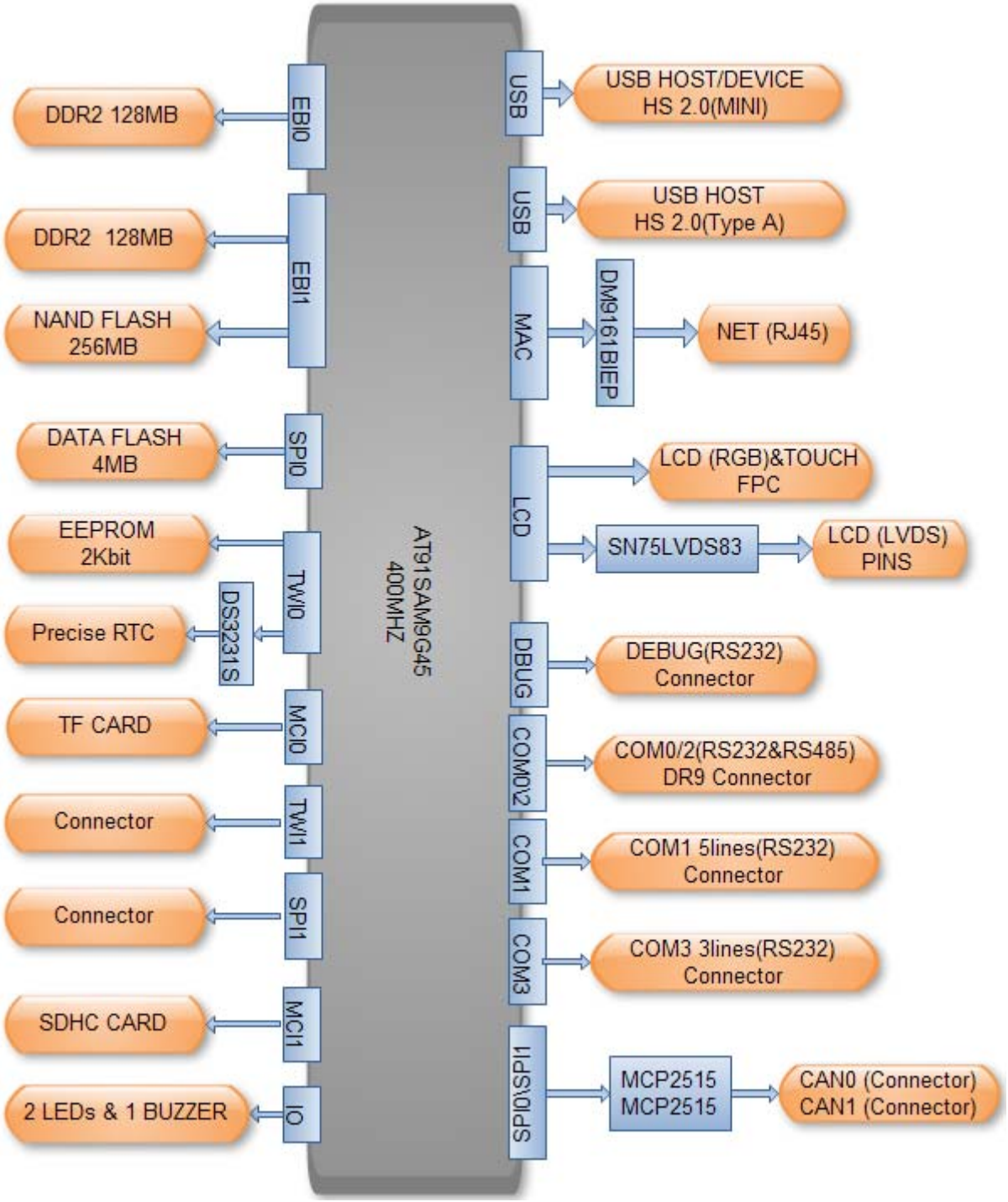
Main board picture：



Dimensions of PCB：185*125mm

Connector pin definitions from board bottom to the core board, please refer to：3 Electrical Description

2.4 General system structure diagram



3 Description of interfaces

3.1 LAYOUT

SYSTEM LAYOUT DIAGRAM:：

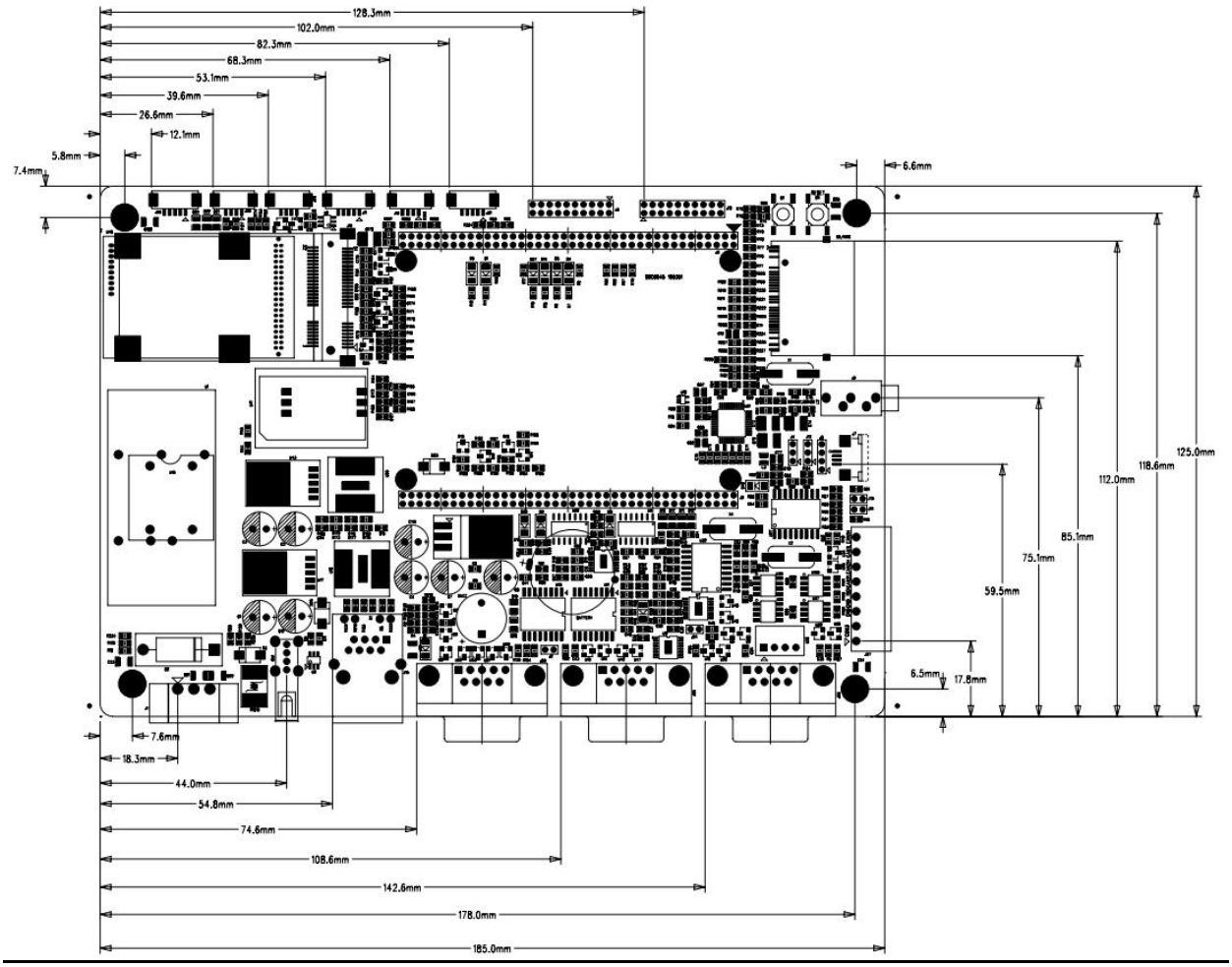


Table 2-1 Interface Details

3.2 POWER（J1）

- Standard 3.81mm Wiring connector can be used to provide the power input +12 V
- Input voltage range :12-36V
- Isolated maximum power limit: 20W
- The power can be protected by fuse, 1.5A limited
- Interface pins are defined as follows: (FGND for the chassis ground)

VCC	**1**
GND	**2**

FGND	3

Power input interface functional definition

3.3 SDHC（SD/MMC）

- High-speed SD card interface
- Compatible SD / MMC interface card
- 8-bit parallel bus data transfer mode
- SD / MMC interface reference CPU resources as follows:

SDHC	PA22	MMC_CDA
	PA23	MMC_DA0
	PA24	MMC_DA1
	PA25	MMC_DA2
	PA26	MMC_DA3
	PA27	MMC_DA4
	PA28	MMC_DA5
	PA29	MMC_DA6
	PA30	MMC_DA7
	PA31	MMC_CK
	PB29	CD
	PB30	WP

3.4 NET（J15）

- the CPU built-in controller
- Work speed: 100Mbps
- Work mode: RMII
- Output interface adopts RJ45 connectors
- CPU resources as follows:

NET	PA10	EXT0
	PA11	EXT1
	PA12	ERX0
	PA13	ERX1
	PA14	ETXEN
	PA15	ERXDV

	PA16	ERXER
	PA17	E_TXCK
	PA18	EMDC
	PA19	EMDIO
	PD5	MDINT

3.5 UART

UART (DEBUG, COM0, COM1, COM2, COM3), all comes from the MCU resource controller

3.5.1 DEBUG serial port (J23)

- Serial DEBUG connector leads with 1132R
- This interface uses 3-wire
- Resources

DEBUG	PC30	DRXD
	PC31	DTXD

DEBUG corresponds to DEBUG serial port from CPU (AT91SAM9G45) .

J23 Pins definition ：

PIN	Function
1	DRRXD
2	DRTXD
3	GND
4	NC

- Signal input/output level: RS232
- Data rate: 115.2kbps
- Flow Control: None

3.5.2 COM 0,2 (J25, J26)

- COM 0,2 with DR9 male serial connector leads RS232 & RS485 level
- COM 0,2 are 3-lines serial port
- This feature provides directly from the CPU pins
- Resources：

UART0	PB19	TXD0
	PB18	RXD0
	PB17	RTS0
UART2	PB6	TXD2
	PB7	RXD2
	PC9	RTS2

COM0、COM2 are a 5-wire universal serial port, it corresponds to USART0 and USART2 from CPU (AT91SAM9G45) .

- Signal input/output level: RS232
- Data rate: 115.2kbps
- Flow Control: None
- Connector: DR9 male

At the same time the two ports also are used for RS485 functional interfaces, data from the CPU is sent out to two functional outputs simultaneously: meanwhile RS232 and RS485, the data from RS232 and RS485 interfaces can be sent back to the CPU.

DR9 interface connector (J25,J26) Pin is defined as follow：

COM0 (J25)	1		COM2 (J26)	1	
	2	RRXD0		2	RRXD2
	3	RTXD0		3	RTXD2
	4			4	
	5	GND		5	GND
	6			6	
	7	485A1		7	485A2
	8	485B1		8	485B2
	9	GND_ISO		9	GND_ISO

3.5.3 COM1（J20）

- COM1 adopts DR9 with RS232 level
- COM1 is 5- lines serial port
- This function provides directly from the CPU pins
- resources：

COM1	PB4	TXD1
	PB5	RXD1
	PD16	RTS1
	PD17	CTS1

COM1 is a 5-wire universal serial port, it corresponds to USART1 on MCU.

- Signal input/output level: RS232
- Data rate: 115.2kbps
- Connector: DR9 Male
- DR9 interface connector (J20) Pin is defined as follow：

COM1 (J20)	1	
	2	RRXD1
	3	RTXD1
	4	
	5	GND
	6	

	7	RRTS1
	8	RCTS1
	9	

3.5.4 COM3（J27）

- COM3 adopts wiring connector with RS232 level
- COM3 is 3- lines serial port
- The function operates with the J40 connector, if use the GPRS or CDMA modules, extending J27 serial function and GPRS functions against J27 can not work at the same time.they just can work individually under the system.
- This function provides directly from the CPU pins
- resources：

COM3	PB8	TXD3
	PB9	RXD3

COM3 is a 3-wire universal serial port, it corresponds to USART3 on MCU.

- Signal input/output level: RS232
- Maximum data rate: 115.2kbps
- Connector: Connector（J27/U40）

Output interface (J27) pin is defined as follow：

COM3	1	RRXD3
	2	RTXD3
	3	GND
CAN2	4	GND_ISO
	5	CAN_L2
	6	CAN_H2
CAN1	7	CAN_L1
	8	CAN_H1

3.6 BUZZER（BUZZ）

- resources：PB20
- Low voltage effective(Active low)

3.7 USB OTG（J11）

- Mini USB connector
- resources（HDMB,HDPB）
- This interface connectors to the bottom board J11 and J19 connectors

- program can be written in or deleted from system via the miniUSB connector on core-board
- This port with OTG function, can be used to connect the USB device on the MINIPCI backplane (such as 3G module)

3.8 USB HOST（CN1）

- Standard Type A connector
- resources（HDMA、HDPA）
- Onboard Item NO：CN1
- High-speed USB 2.0 communication interface

3.9 TWI（J15）

- System provide a TWI interface
- Resources：PB10（TWD1），PB11（TWCK1）
- Interfaces：J15
- Pins definition：

TWI	1	TWD
	2	TWCK
	3	GND
	4	WKUP

3.10 AUDIO OUT（J9）

- Standard 3.5mm audio in/out connector
- 32 Ω Output Load (HP_OUT)
- Resources：

AC97 (J9)	PD6	AC97RX
	PD7	AC97TK
	PD8	AC97FS
	PD9	AC97CK

3.11 JTAG（J10）

VDD33	1	2	VDD33
NTRST	3	4	GND
TDI	5	6	GND
TMS	7	8	GND

TCK	9	10	GND
RTCK	11	12	GND
TDO	13	14	GND
NRST	15	16	GND
	17	18	GND
	19	20	GND

3.12 LCD（J20）

- 40PIN FPC connects to connector interface
- support interface mode 24/16bit mode (Default 16bit mode)
- Supports maximum definition of 1280*860
- This stand is located in the core board, Item NO:J5

CPU signal resources Note：

LCD	PE0	LCDPWR	PE16	LCDD9
	PE1	LCDMOD	PE17	LCDD10
	PE2	LCDCC	PE18	LCDD11
	PE3	LCDVSYNC	PE19	LCDD12
	PE4	LCDHSYNC	PE20	LCDD13
	PE5	LCDDOTCK	PE21	LCDD14
	PE6	LCDDEN	PE22	LCDD15
	PE7	LCDD0	PE23	LCDD16
	PE8	LCDD1	PE24	LCDD17
	PE9	LCDD2	PE25	LCDD18
	PE10	LCDD3	PE26	LCDD19
	PE11	LCDD4	PE27	LCDD20
	PE12	LCDD5	PE28	LCDD21
	PE13	LCDD6	PE29	LCDD22
	PE14	LCDD7	PE30	LCDD23
	PE15	LCDD8		

The connector of LCD interface located on the core-board, regarding to J5 on core-board, applies the upper connector, pin pitch of 0.5mm, and also integrates touch screen function. pin definition as below：

VDD5V	1	2	VDD5V
B0	3	4	B1
B2	5	6	B3
B4	7	8	B5
B6	9	10	B7
GND	11	12	G0
G1	13	14	G2

G3	15	16	G4
G5	17	18	G6
G7	19	20	GND
R0	21	22	R1
R2	23	24	R3
R4	25	26	R5
R6	27	28	R7
GND	29	30	PWREN
LCDMOD	31	32	LCDCC
LCDDEN	33	34	VSYNC
HSYNC	35	36	DCLK
X-	37	38	X+
Y-	39	40	Y+

LCD interface signal functional definition

3.13 KEY（B1）

- 2 keys：IO、TESET
- Item NO：B1:PB31 ,B4:RESET

3.14 TOUCH（J20）

- Touch interface comes from 4pin FPC connector
- Signal name：X+、X-、Y+、Y-
- resource：It comes from CPU
- functional resources：

TOUCH	PD20	X+
	PD21	X-
	PD22	Y+
	PD23	Y-

The definition of interface J7 on Backplane pins are as below (the serial order of the two middle wire can be changed by wire jumper)：

Pin	Function
1	Y-
2	X- (Y+)
3	Y+ (X-)
4	X+

3.15 LVDS（J3）

- Connector:20PIN（10*2）pin headers,2.0mm
- This interface via LCD interface TTL level transferred by the chip
- Support 24-bit mode
- This group of signals is converted into 24-bit LVDS interface signals by the chip of SN75LVDS83, which is located on the core board.the definition of J3 ports linked to back board by connector between core board and the backplane as below：

VDD33V	1	2	VDD33V
GND	3	4	GND
TA-	5	6	TA+
GND	7	8	TB-
TB+	9	10	GND
TC-	11	12	TC+
GND	13	14	TCLK-
TCLK+	15	16	TD-
TD+	17	18	
	19	20	VDD33V

3.16 LED（D20）

- resources：PB21
- Low voltage effective(Active low)
- Wire connector J29 leads out the way IO , which is used as a system status indicator to use
- J29 pin is defined as follow：

LED	1	VDD33V
	2	PB22（470R）
	3	VDD33V
	4	GND（470R）

3.17 CAN（J26）

- 2 CAN communication interface are extended through two groups of SPI controller
- CAN2.0 communication interface
- Resources ：

CAN1	PB0	SPI0_MISO	CAN2	PB14	SPI1_MISO
	PB1	SPI0_MOSI		PB15	SPI1_MOSI
	PB2	SPI0_SPCK		PB16	SPI1_SPCK
	PD24	SPI0_NPCS1		PD18	SPI1_NPCS2
	PD25	INT		PD26	INT

CAN communication interface output to J27 Wiring connector is defined as follows:

COM3	1	RRXD3
	2	RTXD3
	3	GND
CAN2	4	GND_ISO
	5	CAN_L2
	6	CAN_H2
CAN1	7	CAN_L1
	8	CAN_H1

If the establishment of CAN networking needs terminal resistance ,it can be achieved by applying the jumper cap J13, J14 of matching resistor resistor.

(Note: This terminal matching resistance can only be used at both ends of UTP, meanwhile mid device does not require)

3.18 SPI（J31）

System provides a way SPI communication interface. Item NO：J31 pin are defined as follows:：

SPI	1	PB16
	2	PB14
	3	PB15
	4	PD19
	5	GND

3.19 BUZZER（BUZZ）

System hardware offers a buzzer, which can be a GPIO to control: PB20 (Active low)：PB20 (Active low)

3.20 POWER OUT(J28)

- system provides a power output interface ,which can be used to provide power for the external LCD
- Specific output signal J28 following table：

J28	1	VDD12V	
	2	GND	
	3	ON_OFF	PB28
	4	DIMMING	PD31
	5	VDD5V	

3.21 RTC

The system extends a high-definition RTC through TWI interface, the battery on the backplane can be charged automatically .extended resource as below : PA20（SDA），PA21（SCL）

4 System Electrical Description

- Power input：range（12-36V）
- Core board power supply：5V
- Kinds of power：+1.2V，+1.8V，+3.3V，+5V，+12V，
- Total power consumption：+12Vx0.25A (Without Screen)
- Actual test power consumption：
- Ambient temperature：-10-70℃

Core board connect to pin interface on bottom board is defined as follows:

Pin(J8)	Signal	Pin(J8)	Signal	Pin(J6)	Signal	Pin(J6)	Signal
1	GND	41	GND	1	GND	41	SHDN
2	TA-	42	TA+	2	1V8	42	PC1
3	TB-	43	TB+	3	PC0	43	PC6
4	TC-	44	TC+	4	PC7	44	PC9
5	TD-	45	TD+	5	PC10	45	PC11
6	TCLK-	46	TCLK+	6	PC12	46	PC13
7	GND	47	VDD33	7	PC15	47	PC16
8	PD24	48	PD25	8	PC17	48	PC18
9	PD26	49	PD27	9	PC19	49	PC20
10	PA6	50	PE31	10	DRRXD	50	DRTXD
11	PA8	51	PA7	11	PC21	51	PC22
12	PA20	52	PA9	12	PC23	52	PC24
13	PA22	53	PA21	13	PC25	53	PC26
14	PA24	54	PA23	14	PC27	54	PC28
15	PD20	55	PD22	15	PC29	55	PC30
16	PD21	56	PD23	16	PC31	56	PD0
17	PA28	57	PA27	17	PD6	57	PD7
18	PA30	58	PA29	18	PD8	58	PD9
19	PB0	59	PA31	19	GND	59	PD11
20	PB2	60	PB1	20	GND	60	WKUP
21	PB5	61	PB4	21	PD12	61	PD13
22	PB7	62	PB6	22	PD14	62	PD15
23	PB9	63	PB8	23	PD16	63	PD17
24	PB11	64	PB10	24	PD18	64	PD19
25	PA26	65	PA25	25	PD29	65	PD28
26		66	GND	26	PD31	66	PD30
27	PB15	67	PB14	27	PB20	67	PB21
28	PB17	68	PB16	28	PB22	68	PB23
29	PB19	69	PB18	29	PB24	69	PB25
30	NRST	70	VDD5V	30	PB26	70	PB27
31	PD10	71	VSBAT	31	PB28	71	PB29
32	PA5	72	PA4	32	PB30	72	NTRST
33	PA2	73	PA1	33	PB31	73	TDI
34	PA3	74	PA0	34	RTCK	74	TDO
35	GND	75	PB3	35	TCK	75	TMS
36	LED4	76	LED5	36	USB_B_VB	76	USB_A_VB
37	RX2-	77	RX2+	37	HDPA	77	HDMA
38	VDD33	78	AVDDT	38	VDD5V	78	
39	TX2-	79	TX2+	39	HDPB	79	HDMB

40	GND	80	VDD5V	40	GND	80	GND

Note：
In addition the functions of on the core board，but also through 160PIN double straight leads out functions as follows：
8-bit single channel LVDS interface (24-bit color)
Network port differential line
DEBUG serial port
USART0-3
USB OTG（HS）
USB 2.0
SPI*2
TWI*2
SDIO(HS)
PWM
ISI
AC97
TOUCH
JTAG
GPIOs

Chapter Three: Linux System

5 Overview of Linux system

SBC6045 BSP mainly used for customization Linux for SBC6045 hardware platform, you can do secondary development based on the development kit. The SBC6045 CD provides the BSP packet that refers to table 1-1 content.

Table 1-1 specification of SBC6045 BSP

Name		Remark
BIOS	Bootstrap	NANDFLASH
	u-boot	NAND
		NET and SAM-BA downloader image
Kernel	Linux-2.6.x	ROM/CRAM/EXT2/EXT3/FAT/NFS/ JFFS2/YAFFS2..etc
Device Driver	Serial	CPU DEBUG and four-way Serial
	RTC	AT91SAM9G45 extended RTC driver
	NET	10/100M Ethernet driver
	Flash	Nand Flash driver
	LCD	TFT LCD driver for 480x272 800x480 and 800x600 Pixel LCD
	Touch Screen	The CPU touch screen control
	USB Host	USB Host driver
	USB Device	USB Device driver
	Watchdog	Watchdog driver
	SD Card	SD card driver
	EEPROM	2K bits EEPROM
	CAN	Two-way extended CAN BUS driver
	RS-485	One-way extended RS-485
	LED	LED driver
	BEEP	Beep driver
Root file system	YAFFS2	RW file system
Graphics	QT	Version number 4.4.2

6 Getting Start with SBC6045

Note:If you use the HyperTerminal on the PC when SBC6045 is booting, please configure your connection software like this:
Baud rate:115200
Data: 8bit;
Parity:None
Stop: 1bit
Flow control: None

6.1 Getting Start from Nandflash

The development board support booting from nandflash.If you want to boot from the nandflash, you should close the J4 on the board. When out factory, we have downloader image to the nandflash. If you want to update the image, you can refer to the "Chapter 5 Update the System Image".

Note: The system image update can refer to【Chapter 5 Update the System Image】

6.2 Setting the type of LCD Screen

Now the development board driver support three types of LCD screen,there are 480x272, 800x480, 800x600.

Set the tft parameter for the LCD.and the kernel can loader driver for the LCD.The tft param is follow:

LCD screen size	LCD set parameter	LCD pixel
4.3 inch	s	480x272
7.0 inch	m	800x480
10.4 inch	b	800x600

Setting method is in the U-BOOT follow:

U-Boot> **set bootargs console=ttySAC0,115200 tft=s root=/dev/mtdblock6 mtdparts=atmel_nand:128k(bootstrap)ro,256k(uboot)ro,128k(env1)ro,128k(env2)ro,1M(logo)ro ,2M(linux),-(root) rw rootfstype=yaffs2**

7 Test Tutorials of the SBC6045

7.1 Touch Screen Test

All about touch screen hardware connects can refer to "Hardware manual of SBC6045 "

1. Enter the following command procedures for the implementation of touch screen calibration:

[root@Mini6045:/]# **ts_calibrate**

Follow the on-screen prompts, click the "+" icon five times to complete the calibration.

2. Upon completion of calibration, enter the following commands for touch-screen test:

```
[root@Mini6045:/]# ts_test
```

Follow the on-screen prompts, can choice of “draw point’ or “draw line” test.

Note: pressing the Ctrl+C then exit the test program.

7.2 Net Test

There have a MACB 10/100M Ethernet on the development board, users can use it connect to network, and use following command to test:

```
~ $   ifconfig eth0 192.192.192.200
~ $   ping 192.192.192.105
PING 192.192.192.105 (192.192.192.105): 56 data bytes
64 bytes from 192.192.192.105: icmp_seq=0 ttl=64 time=0.5 ms
64 bytes from 192.192.192.105: icmp_seq=1 ttl=64 time=0.3 ms
64 bytes from 192.192.192.105: icmp_seq=2 ttl=64 time=0.3 ms
64 bytes from 192.192.192.105: icmp_seq=3 ttl=64 time=0.3 ms
64 bytes from 192.192.192.105: icmp_seq=4 ttl=64 time=0.3 ms
64 bytes from 192.192.192.105: icmp_seq=5 ttl=64 time=0.3 ms
64 bytes from 192.192.192.105: icmp_seq=6 ttl=64 time=0.3 ms

--- 192.192.192.105 ping statistics ---
7 packets transmitted, 7 packets received, 0% packet loss
round-trip min/avg/max = 0.3/0.3/0.5 ms
~ $
```

Note: pressing the Ctrl+C then exit the test program.

7.3 UART Test

There are five serial ports on the development board,which CPU has 4,and each device namded for linux is “ttySAC0,ttySAC1,ttySAC2, ttySAC3 and ttySAC4” . “ttySAC0” is used for debug, “ttySAC1” and “ttySAC3” is used for RS-485(They also could be used for Serial). You can do test with the following commands. All about serial ports connect can refer to “Hardware manual of SBC6045”

```
[root@Mini6045:/home/app]# ./com -d /dev/ttySAC1 -s 1234567890
```

7.4 CAN Bus Test

There are two extended CAN Bus device on the development board. All about the CAN Bus hardware connect can refer to “Hardware manual of SBC6045” .

1. CAN receive test:

```
[root@Mini6045:/]# cd /home/app/can/
[root@Mini6045:/home/app/can]# ./receive can0
```

This is received data.

```
Received with ret=1:     1246986251.249889 id=1/0x00000001
            len=8 flags=0x00 : sD : msg= 00 11 22 33 44 55 66 77
```

```
Received with ret=1:     1246986252.701898 id=1/0x00000001
          len=8 flags=0x00 : sD : msg= 00 11 22 33 44 55 66 77
Received with ret=1:     1246986254.069926 id=1/0x00000001
          len=8 flags=0x00 : sD : msg= 00 11 22 33 44 55 66 77
```

2. CAN transmit test.

```
[root@Mini6045:/home/app/can]# ./transmit can0
```

Notes: Press CONTROL+C to terminate.

7.5 RS-485 Test

The RS-485 takes up serial device /dev/ttySAC1 and /dev/ttySAC3. Test methods, such as serial port can be tested solution, but only in hardware connect is different.

7.6 USB Host Test

There only one USB host device on the development board. Test the USB host will need a USB device (For example, a USB disk). When you plug in a USB device, system will print related information on your Hyper Terminal.

```
usb 1-1: USB disconnect, address 2
usb 1-1: new full speed USB device using at91_ohci and address 3
usb 1-1: configuration #1 chosen from 1 choice
scsi2 : SCSI emulation for USB Mass Storage devices
scsi 2:0:0:0: Direct-Access     Generic  USB  SD Reader    0.00 PQ: 0 ANSI: 2
sd 2:0:0:0: [sda] 7744512 512-byte hardware sectors (3965 MB)
sd 2:0:0:0: [sda] Write Protect is off
sd 2:0:0:0: [sda] Assuming drive cache: write through
sd 2:0:0:0: [sda] 7744512 512-byte hardware sectors (3965 MB)
sd 2:0:0:0: [sda] Write Protect is off
sd 2:0:0:0: [sda] Assuming drive cache: write through
 sda: sda1
sd 2:0:0:0: [sdb] Attached SCSI removable disk
sd 2:0:0:0: Attached scsi generic sg1 type 0
```

Prompted by the above information can be seen that usb disk device was identified as sda1. You can do test with the following command.

1. Users can opera the usb disk after mount u-disk by following command, because Linux system is request must have a directory was used by usb disk.For example, you can mount it into /mnt directory and set vfat format.

```
[root@Mini6045:/]# mount -t vfat /dev/sda1 /mnt/
```

2. Enter into the directory and view files.

```
[root@Mini6045:/]# cd /mnt/
[root@Mini6045:/mnt]# ls
```

3.Umount the usb disk

```
[root@Mini6045:/mnt]# cd /
[root@Mini6045:/]# umount /mnt/
```

Note: usb disk will identify as sda device by default, you can seen it from system prompt.

7.7 RTC Test

The development board has hardware clock chip used for store/restore system time. You can opera the RTC like this:

1. View system clock information

```
[root@Mini6045:/]# date
Thu May 27 11:48:02 UTC 2010
```

2. Change the date, like July 10 09:01 2009.

```
[root@Mini6045:/]# date 201005271149
Thu May 27 11:49:00 UTC 2010
```

3.Save the system clock to RTC

```
[root@Mini6045:/]# hwclock -w
```

4. View RTC clock information

```
[root@Mini6045:/]# hwclock -r
Thu May 27 11:49:07 2010    0.000000 seconds
```

5. Restore the RTC backup to system.

```
[root@Mini6045:/]# hwclock -s
[root@Mini6045:/]# date
Thu May 27 11:49:45 UTC 2010
```

7.8 EEPROM Test

In Linux system, the EEPROM device was regarded as a virtual file, you can use the following command to operate the EEPROM.

1. Write data to EEPROM

```
[root@Mini6045:/]# echo "aaa" >/sys/bus/i2c/devices/0-0050/eeprom
```

2. Read data from EEPROM

```
[root@Mini6045:/]# cat /sys/bus/i2c/devices/0-0050/eeprom
```

7.9 SD Card Test

Insert in SD card, the system will print the following information. User can execute the following mount command to mount SD card and access SD card.

```
[root@Mini6045:/]# mmc1: new SD card at address 0002
mmcblk0: mmc1:0002 N/A     489 MiB
 mmcblk0: p1
```

Prompted by the above information can be seen that SD card was identified as mmcblk0p1. You can do test with the following command.

1. Users can opera the SD card after mount SD card by following command, because Linux system is request must have a directory was used by SD card . For example, you can mount it into /mnt directory and set vfat format.

```
[root@Mini6045:/]# mount -t vfat /dev/mmcblk0p1 /mnt/
```

2. Enter into the directory and view files.

```
[root@Mini6045:/]# cd /mnt/
[root@Mini6045:/mnt]# ls
```

3. Umount theSD card

```
[root@Mini6045:/mnt]# cd /
[root@Mini6045:/]# umount /mnt/
```

Note: SD card will identify as mmcblk0p1 device by default, you can seen it from system prompt.

7.10 LED Test

There are some leds on the development board, they are used as indication. You can do test with following command.

1. Turn on led (D20)

```
[root@Mini6045:/]# echo '0' >/sys/class/leds/d7/brightness
```

2. Turn off led (D20)

```
[root@Mini6045:/]# echo '1' >/sys/class/leds/d7/brightness
```

7.11 Beep Test

There have a Beep driving circuit on the development board. You can operate the Beep like this:

1. Beep ring

```
[root@Mini6045:/]# echo '1' >/sys/class/leds/beep/brightness
```

2. Beep stop

```
[root@Mini6045:/]# echo '0' >/sys/class/leds/beep/brightness
```

8 Setting the Development Environment

Before development the SBC6045, users must setup arm-linux cross development environment. Following the example of Ubuntu operating system(Linux).

8.1 Install the Cross Compiler

If you have not installed arm-none-linux-gnueabi-gcc, copy **"/media/cdrom/linux/tools/arm-2007q1-10-arm-none-linux-gnueabi-i686-pc-linux-gnu.tar.bz2"** (from CD) to the folder of Linux system.

The installation command is:

```
mkdir /usr/local/arm
tar –jxvf arm-2007q1-10-arm-none-linux-gnueabi-i686-pc-linux-gnu.tar.bz2 –C /usr/local/arm
```

8.2 Setting the Cross-compiler Environment

Define the path of compiler after installation is completed.

```
export PATH=/usr/local/arm/arm-2007q1/bin/:$PATH
```

Note:You can copy it to ".bashrc" file, that it'll add the PATH automatically when OS is booting.

8.3 Compiler the System of the SBC6045

8.3.1 Ready to Compiler Files

All components of the system's source is located in "linux/source" directory, you must decompression the files before development.

For example:

```
root@LINUXSERVER:~# mkdir embest
root@LINUXSERVER:~# cd embest/
root@LINUXSERVER:~/embest# cp /media/cdrom/02\ Linux\ 2.6\ Kit/01\ SourceCode/bootloader/Bootstrap-v1.14.tar.bz2 ./
root@LINUXSERVER:~/embest# cp /media/cdrom/02\ Linux\ 2.6\ Kit/01\ SourceCode/bootloader/u-boot-1.3.4.tar.bz2 ./
root@LINUXSERVER:~/embest# cp /media/02\ Linux\ 2.6\ Kit/01\ SourceCode/kernel /linux-2.6.30.tar.bz2 ./
root@LINUXSERVER:~/embest#
    cp /media/cdrom/02\ Linux\ 2.6\ Kit/01\ SourceCode/rfs/rfs-qtopia.tar.bz2 ./
root@LINUXSERVER:~/embest# mkdir tools
root@LINUXSERVER:~/embest# cd tools/
root@LINUXSERVER:~/embest/tools#
cp /media/cdrom/02\ Linux\ 2.6\ Kit/02\ Tools/mkyaffs2image ./
root@LINUXSERVER:~/embest/tools#
cp /media/cdrom/02\ Linux\ 2.6\ Kit/02\ Tools/mkimage ./
root@LINUXSERVER:~/embest/tools# export PATH=/root/embest/tools:$PATH
root@LINUXSERVER:~/embest/tools# cd ../
root@LINUXSERVER:~/embest# tar jxvf Bootstrap-v1.14.tar.bz2
```

```
root@LINUXSERVER:~/embest# tar jxvf u-boot-1.3.4.tar.bz2
root@LINUXSERVER:~/embest# tar jxvf linux-2.6.30.tar.bz2
root@LINUXSERVER:~/embest# tar jxvf rfs-qtopia.tar.bz2
```

When operation for complete, that you can see linux-2.6.30、u-boot-1.3.4、Bootstrap-v1.14、rfs-qtopia four directory will be generated under the current folder.

8.3.2 The First Booting Stage -AT91Bootstarp

SBC6045 development board is support for boot from nandflash, following commands will be generated nandflash_at91sam9g45ekes.bin binary file.

```
root@LINUXSERVER:~/embest# cd Bootstrap-v1.14
root@LINUXSERVER:~/embest/Bootstrap-v1.14# cd board/at91sam9g45ekes/nandflash
root@LINUXSERVER:~/embest/Bootstrap-v1.14/board/at91sam9g45ekes/nandflash# make
```

When operation for complete,we need nandflash_at91sam9g45ekes.bin binary file in the current directory.

8.3.3 The Second Booting Stage-U-boot

U-boot is used in the second booting stage of SBC6045, enter the following commands in the terminal, u-boot.bin will be generated under current folder.

```
root@LINUXSERVER:~/embest/u-boot-1.3.4# make at91sam9g45ekes_nandflash_config
root@LINUXSERVER:~/embest/u-boot-1.3.4# make
```

When operation for complete, we need u-boot.bin binary file in the current directory.

8.3.4 The Third Booting Stage-Kernel

You can use the follow commands to complier kernel:

```
root@LINUXSERVER:~/embest/linux-2.6.30#
    cp arch/arm/configs/SBC6045 _defconfig .config
root@LINUXSERVER:~/embest/linux-2.6.30# make menuconfig
root@LINUXSERVER:~/embest/linux-2.6.30# make uImage
```

Wait the compilation of uImage to be finished, and found it under /arch/arm/boot/ folder.

8.3.5 Make Root File System Image

Use the follow commands to generated rfs.yaffs2 file as we need with tool program "*02 Linux 2.6 Kit\02 Tools\mkyaffs2image*" in CD.

```
root@LINUXSERVER:~/embest# mkyaffs2image rfs/ rfs.yaffs2
```

8.4 System Customization

In fact, there are many kernel configuration options at Linux kernel, users can Increase or reduction of kernel features, make better suited to the needs of users. The next chapter is an example for kernel configuration process.

Kernel source code in the factory provided the default configuration file:

arch/arm/configs/SBC6045_defconfig

Users can custom system base on the default configuration file.

```
root@LINUXSERVER:~/embest/linux-2.6.30#
```

```
cp arch/arm/configs/SBC6045_defconfig .config
root@LINUXSERVER:~/embest/linux-2.6.30# make menuconfig
```

The following configure for each driver Help:

RTC Driver:

1.Select Device drivers

2.Select Real Time Clock

3.Select Maxim/Dallas DS3231

Watchdog Driver

1.Select Device drivers

2.Select Watchdog Timer Support

3.Select AT91SAM9 watchdog

MACB Driver

1.Select Device Drivers

2.Select Network device support

3.Select Ethernet(10 or 100Mbit)

3.Select Atmel MACB support

Graphics support

1.Select Device Drivers

2.Select Graphics support

3.Select Support for frame buffer devices

4.Select AT91/AT32 LCD Controller support

Touch Screen Driver

1.Select Device Drivers

2.Select Input device support

3.Select Touchscreens

4.Select Atmel Touchscreen Interface

Save the config,compile the kernel by follow command:

```
root@LINUXSERVER:~/embest/linux-2.6.24# make uImage
```

9 Update the System Image

The development board with Nandflash, currently supports nandflash from startup.

9.1 System Image Map

The Map of Nandflash Startup

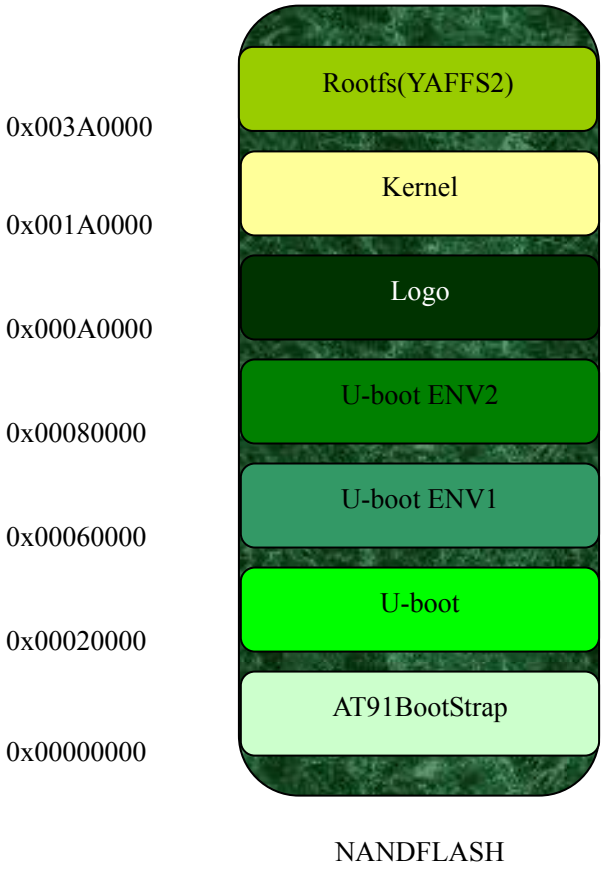


Figure 5.1 Nandflash image map

9.2 Setting the Environment of Burning Image

Install the application *02 Linux2.6 Kit\02 Tools\Install AT91-ISP v1.13.exe* (or higher) in your PC. You will see the icon *SAM-BA v2.9* appearing on the desktop of PC.

9.3 Burning System Image

9.3.1 Burn the Image of the first stage –AT91BootStarp

- Connect debug serial port. About hardware connects can refer to "Hardware manual of SBC6045 ".
- Connect USB to your PC using USB cable.
- Make sure no SD card in the development board.

- Open the HyperTerminalon the PC, config the baud 115200, 8 bit data, 1 bit stop, none parity, none Flow control.
- Before power on, open the **J1**, **J4** and **J10**. Then power on.
- Double click the ***SAMBA v2.9*** cursor on the desktop of the PC.

Figure 5.3.1 SAM-BA v2.9 software icons

- Shown in the figure below, select "***at91sam9g45-ek***" and "***\usb\ARM0***", and click "*Connect*".

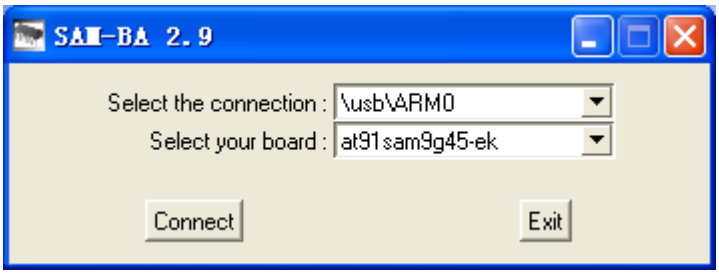


Figure 5.3.2 SAM-BA startup interface

- After click "***Connect***", then entering SAM-BA software.

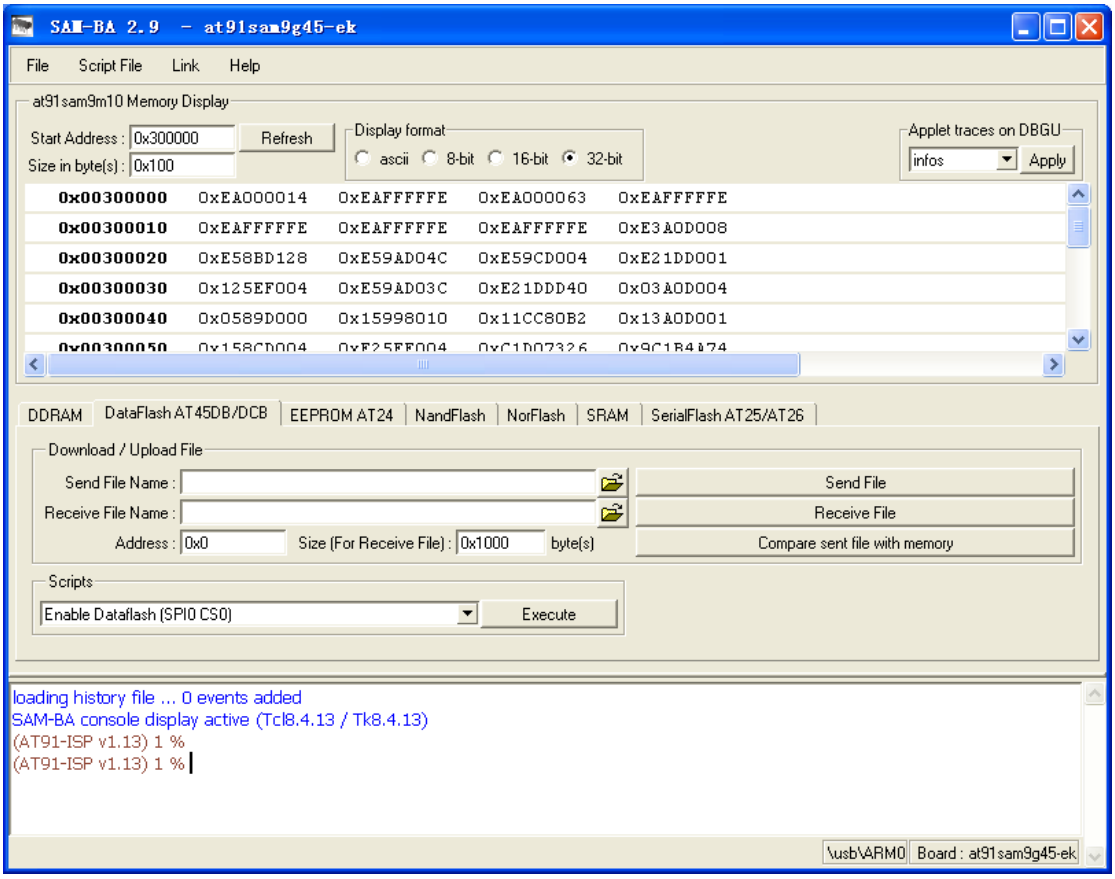


Figure 5.3.3 SAM-BA burn interface

- Close the **J4**, select "***nandflash***" tab. Then select the options "***Enable NandFlash)***" at "***Scripts***" Pull-down menus, then click "***Execute***". Shown in the figure below:

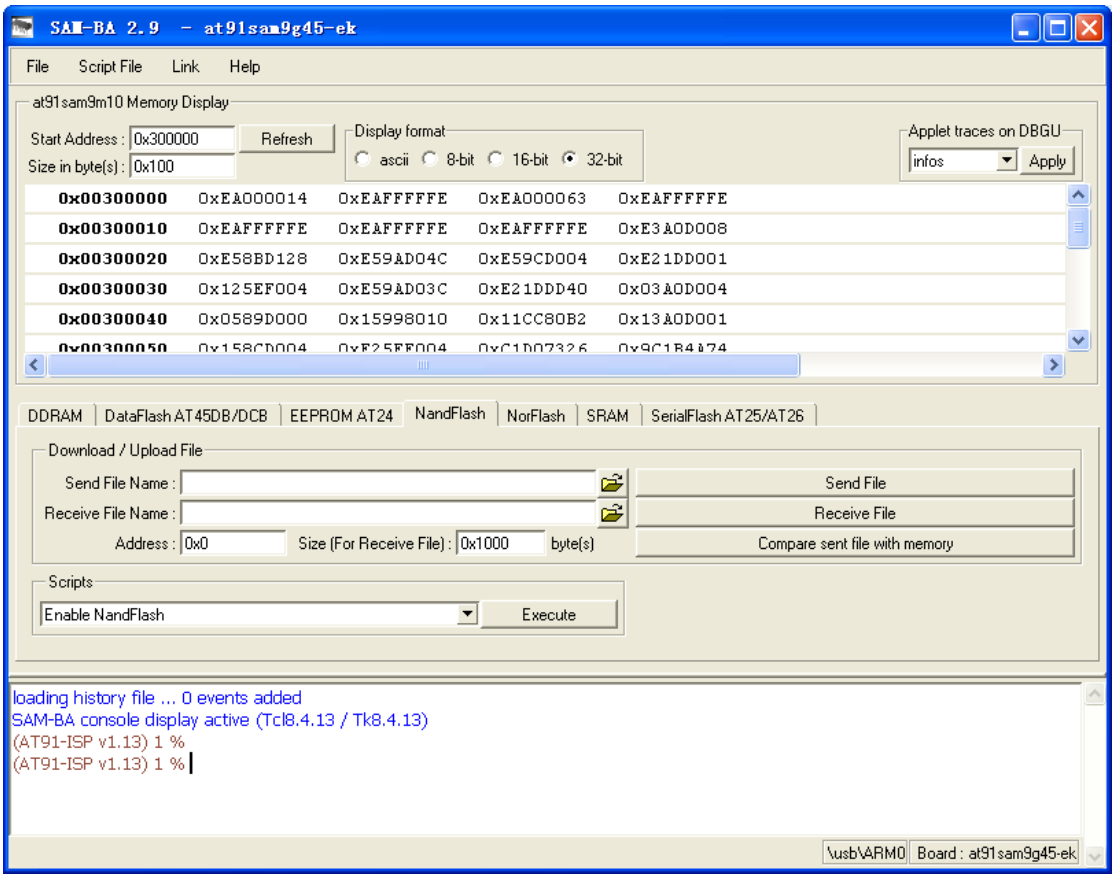


Figure 5.3.4 SAM-BA enable the nandflash

- At "***Scripts***" Pull-down menus, select "***Erase All***", and click "***Execute***", wait for a moment, you can see nandflash will be erased.

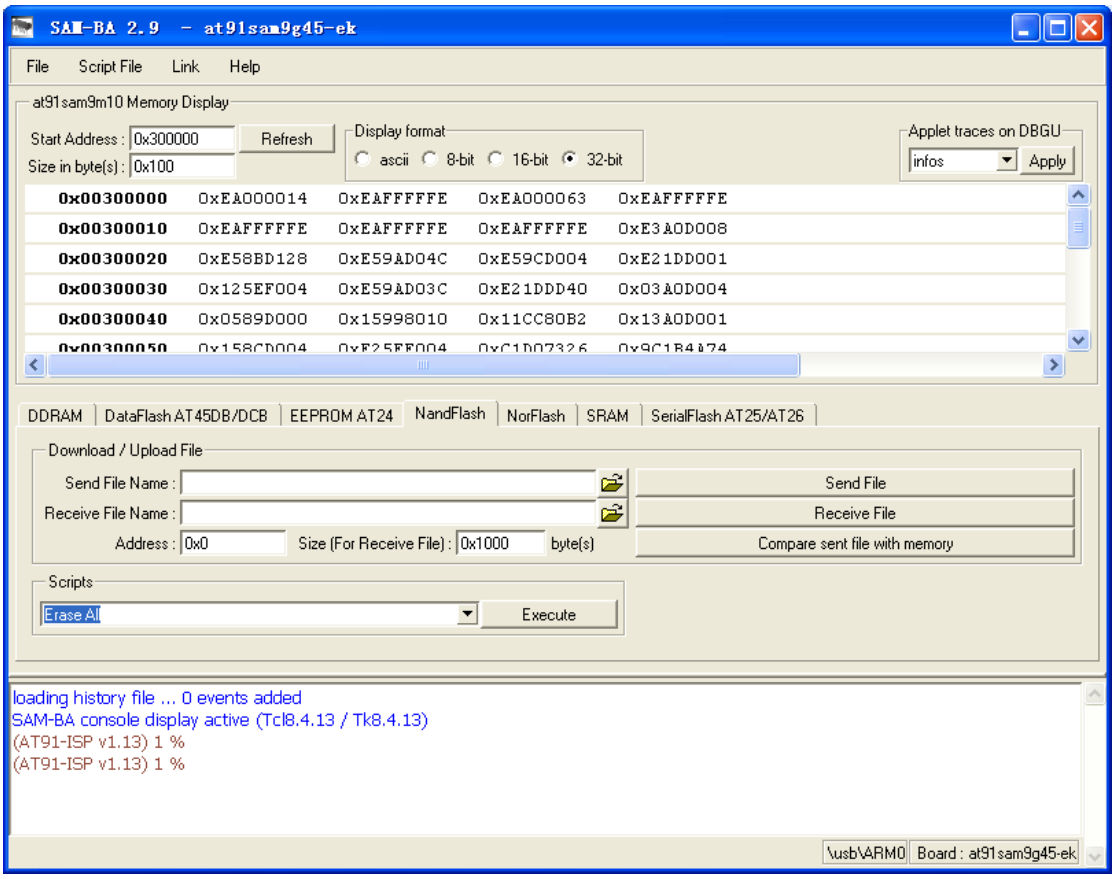


Figure 5.3.5 SAM-BA erase nandflash interface

- At "***Scripts***" Pull-down menus, select "***Scrub NandFlash***", and click "***Execute***", wait for a moment, you can see nandflash will be Erased.

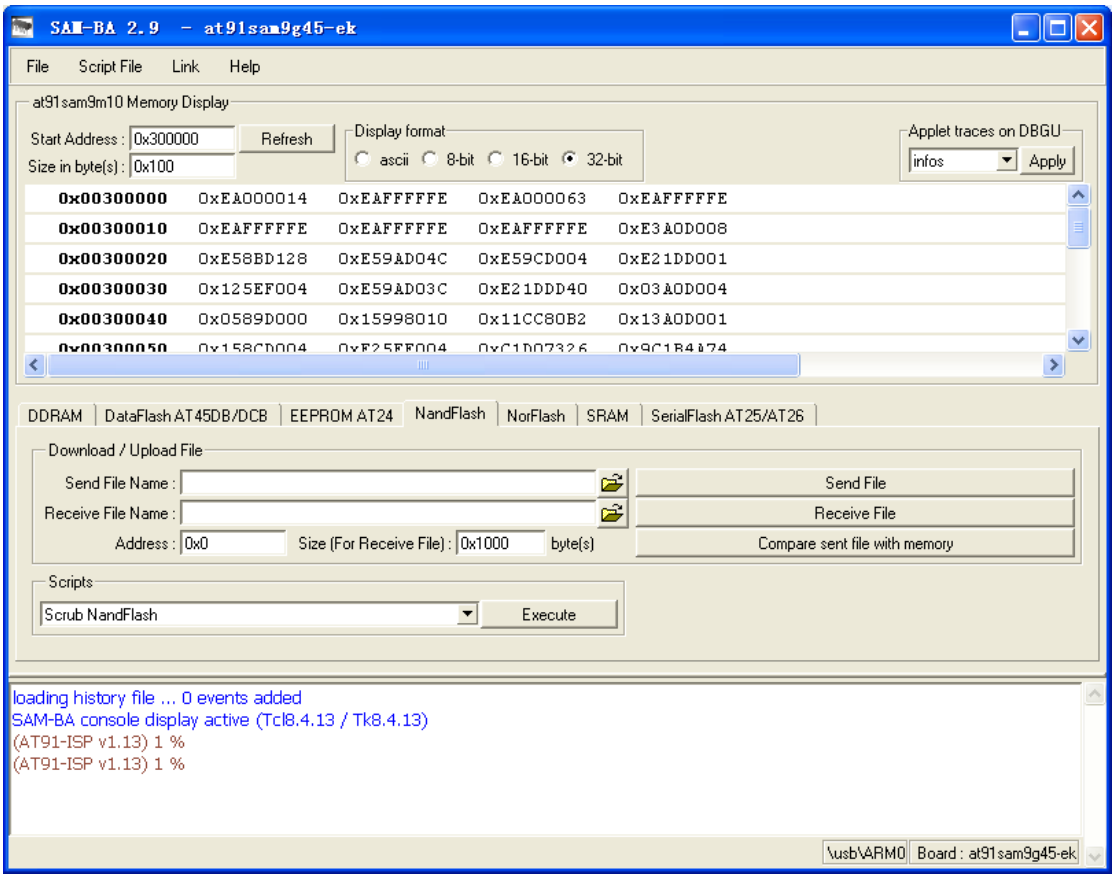


Figure 5.3.6 SAM-BA erase nandflash interface

➢ At "***Scripts***" Pull-down menus, select "***Send Boot File***", and click "***Execute***".

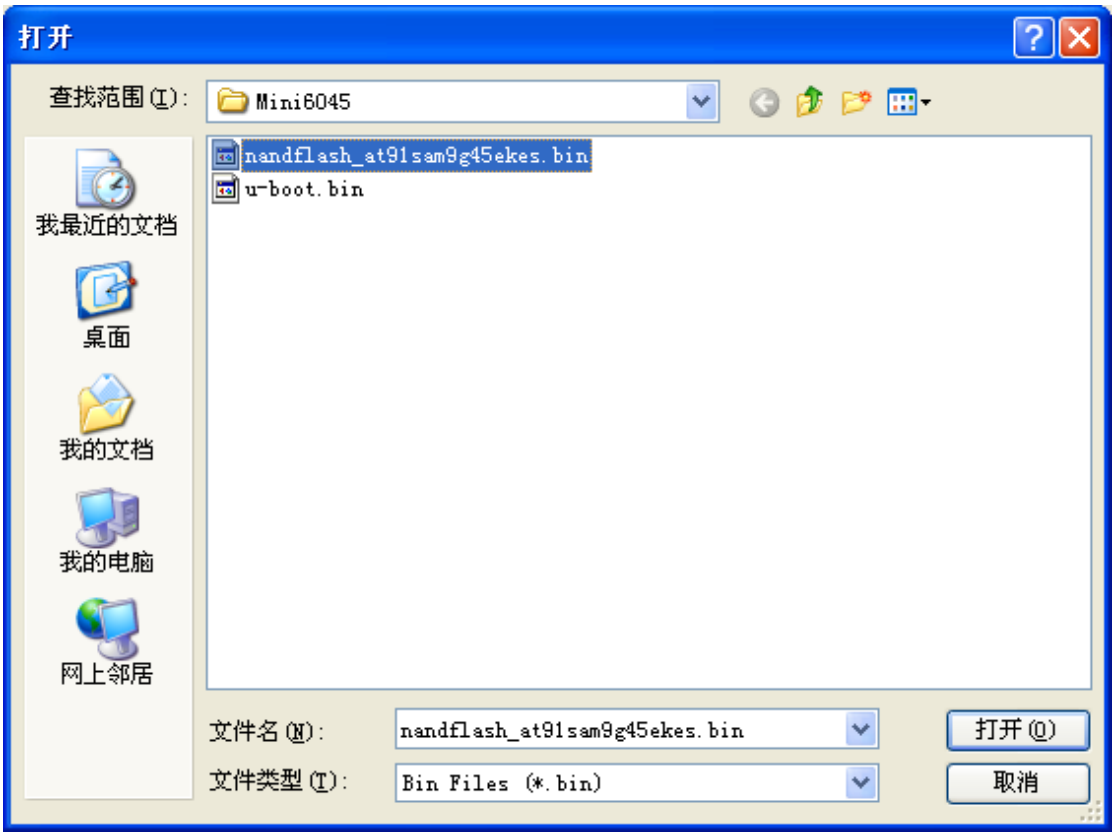


Figure 5.3.7 SAM-BA burn nandlash_at91sam9g45ekes.bin

- When you click "***Execute***", you will open a dialog box, select "***nandflash_at91sam9g45ekes.bin***" and click open. Then you can download this file to target board.

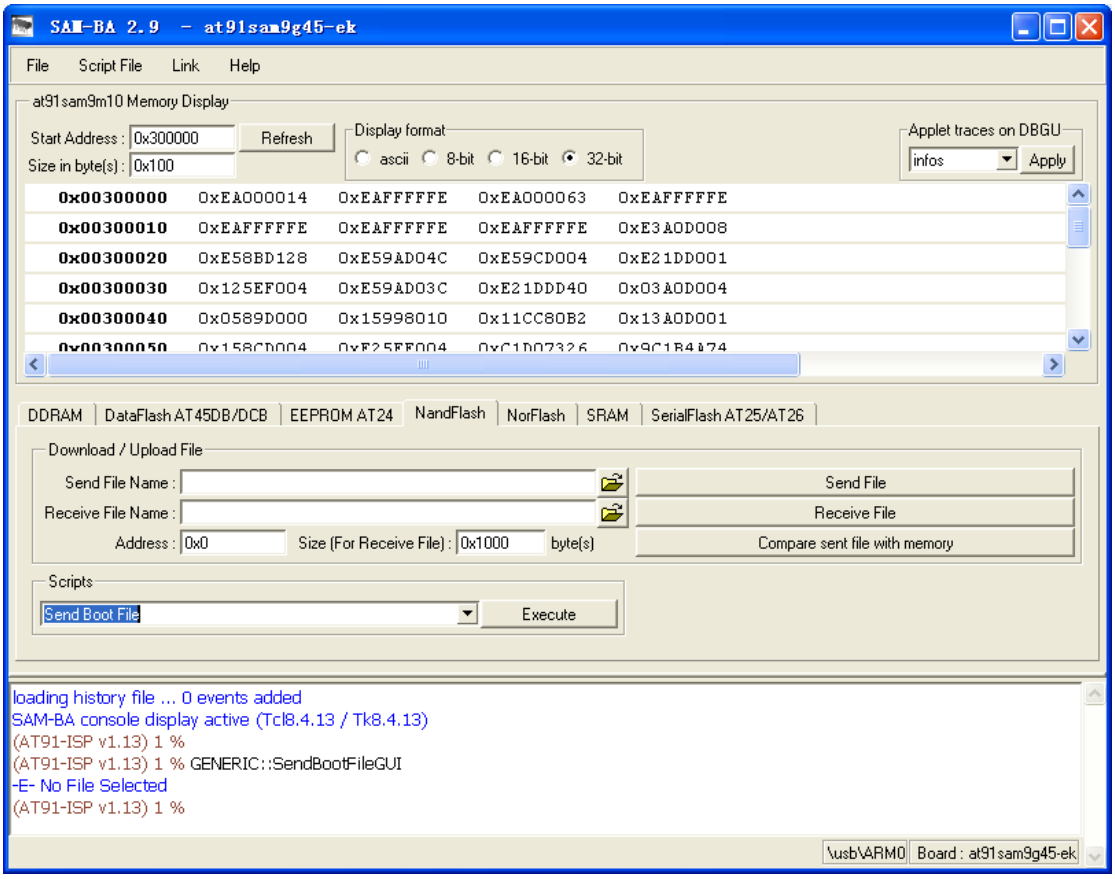


Figure 5.3.8 SAM-BA burn nand_at91sam9g45ekes.bin

9.3.2 Burn the Image of second booting stage u-boot.

Burn the u-boot.bin file to nandflash through SAM-BA.

- Enter the downloader address of U-boot in the "***address***" field: "***0x20000***"

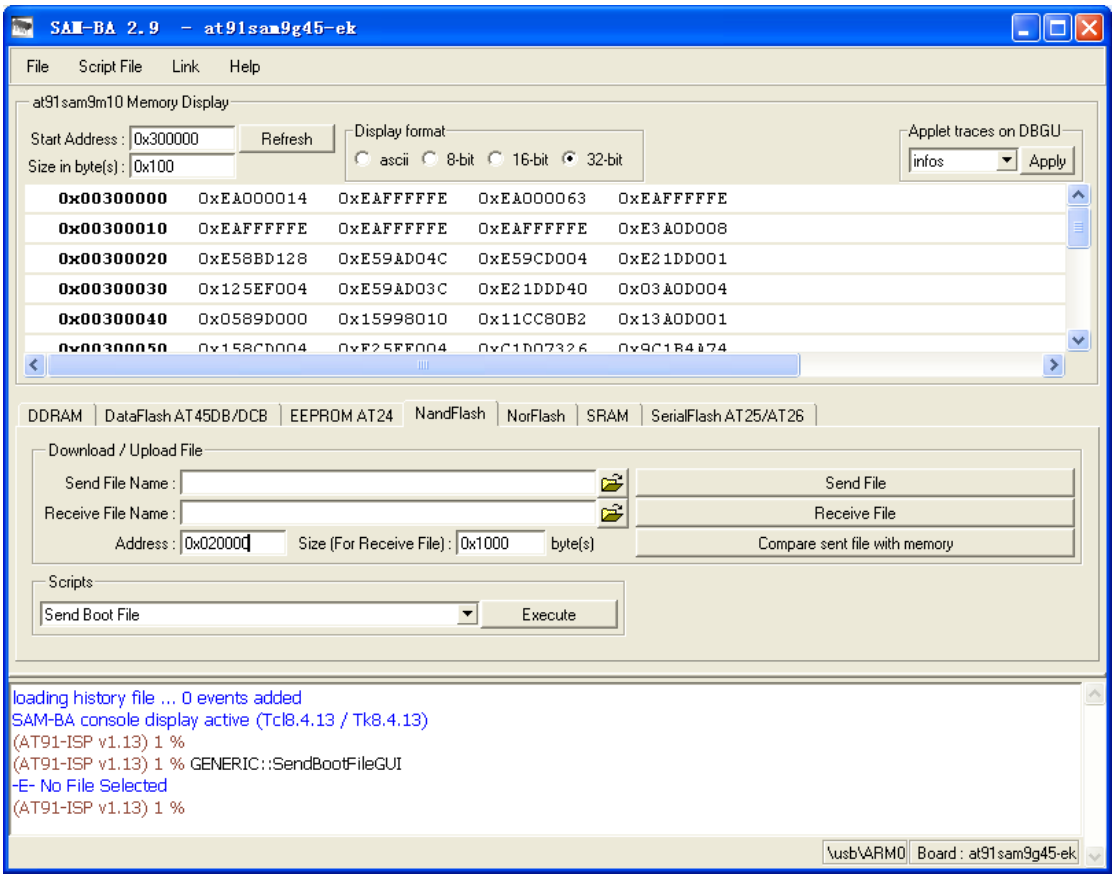


Figure 5.3.9 SAM-BA burn u-boot.bin

➢ Open the "***Send File Name***" browse window, click "***open folder***" button.

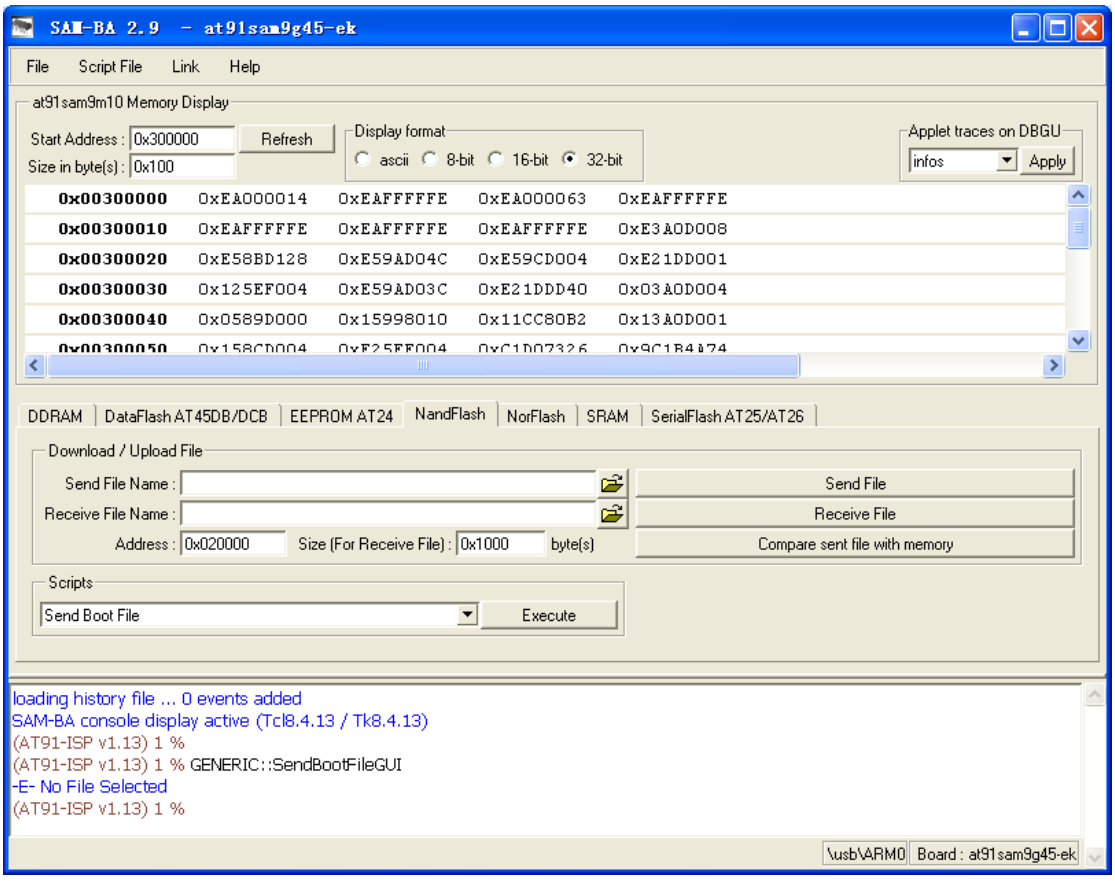


Figure 5.3.10 SAM-BA burn u-boot.bin

- You will open a dialog box, select "***u-boot.bin***" and click open

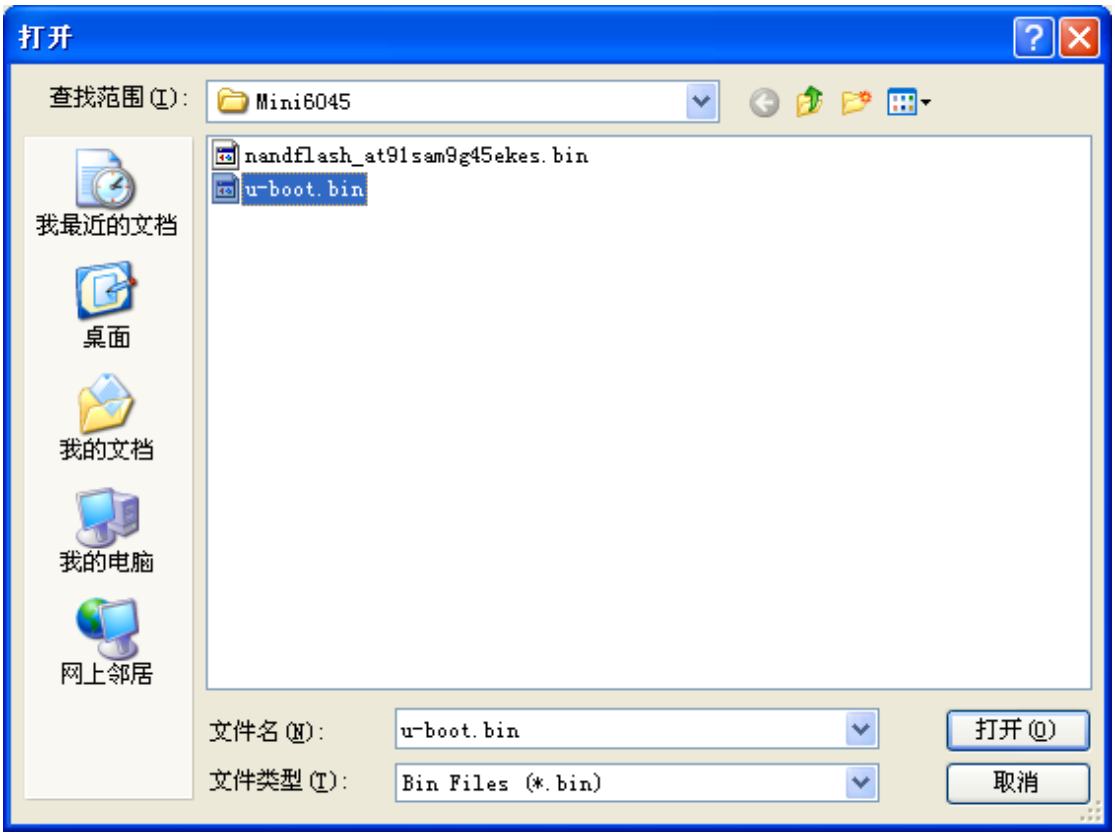


Figure 5.3.11 SAM-BA burn u-boot.bin

- Then download "***u-boot.bin***" to target board dataflash, click "***Send File***" button to burn "u-boot.bin" file to nandflash.

9.3.3 Burn the Logo Image –Logo

Burn "logo.bin" file to nandflash through SAM-BA.

- Enter the downloader address of uImage in the "***address***" field:"***0xA0000***".

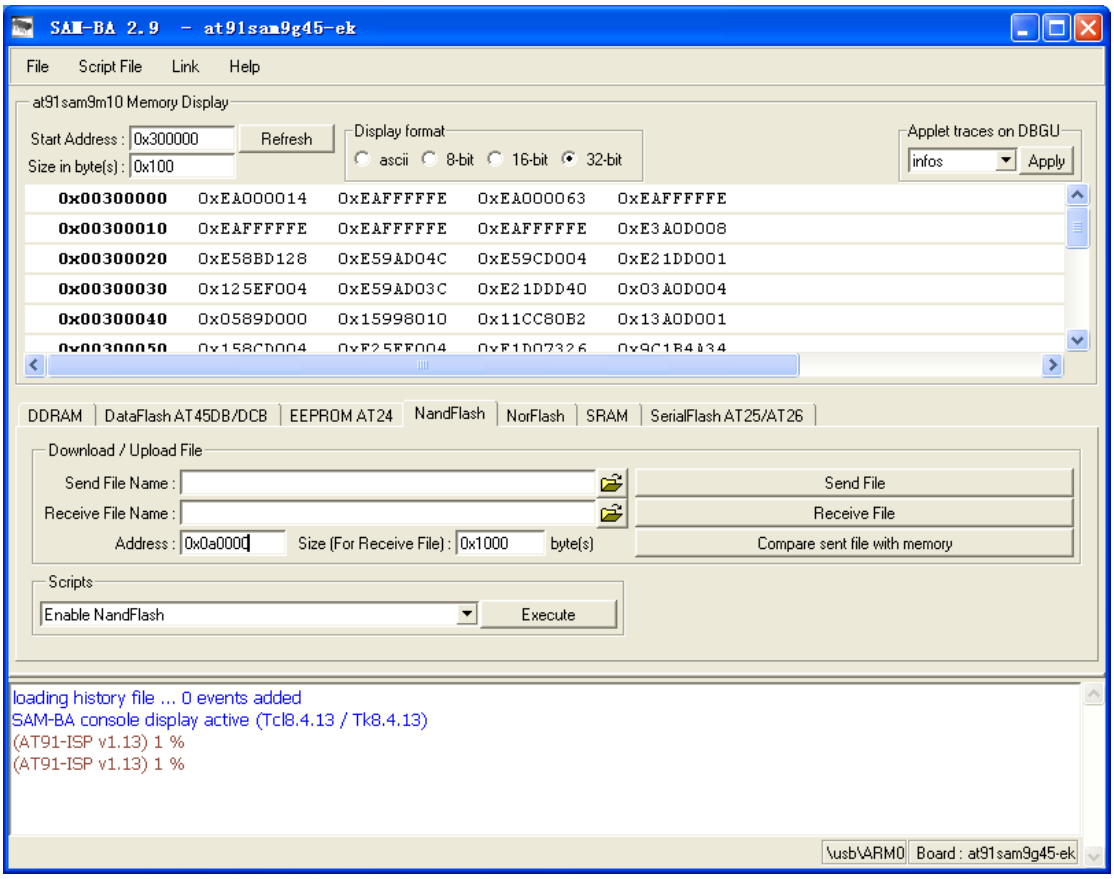


Figure 5.3.12 SAM-BA burn logo.bin to nandflash

➢ Open the "***Send File Name***" browse window, click "***open folder***" button.

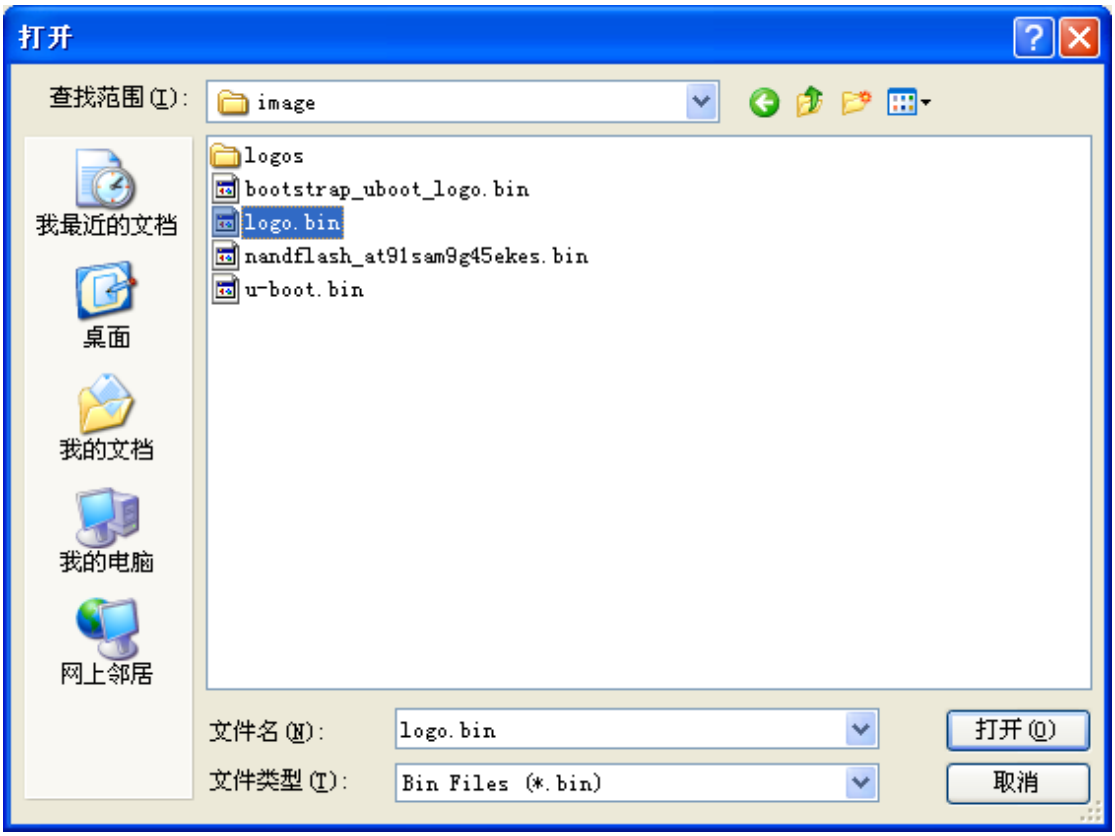


Figure 5.3.13 SAM-BA burn logo.bin to nandflash

- Open the "***Send File Name***" browse window, select "***logo.bin***",as shown in the figure below.
- Click "***Send File***" button to burn "***logo.bin***" to nandflash.

9.3.4 Burn the Image of the third booting –kenel

Burn "uImage" file to nandflash through SAM-BA.

- Enter the downloader address of uImage in the "***address***" field:"***0x1A0000***".

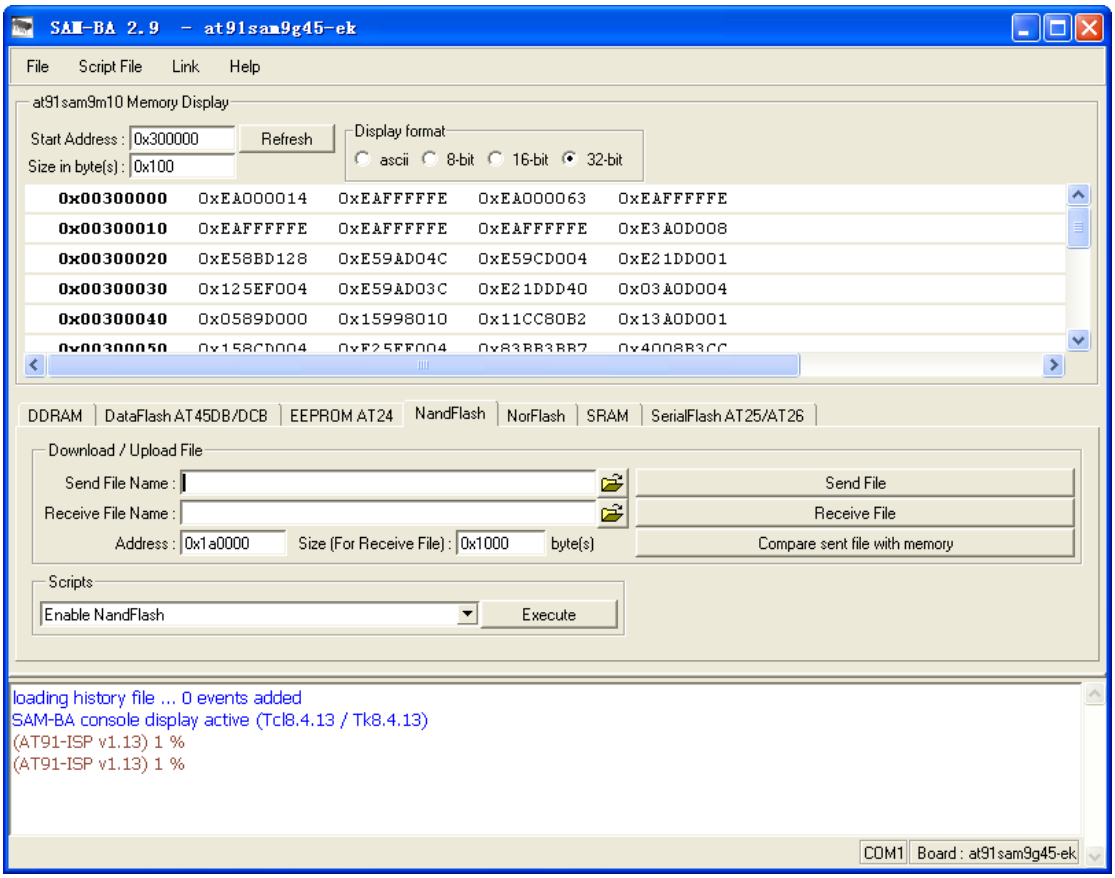


Figure 5.3.14 SAM-BA burn uImage to nandflash

- Open the "***Send File Name***" browse window, click "***open folder***" button.

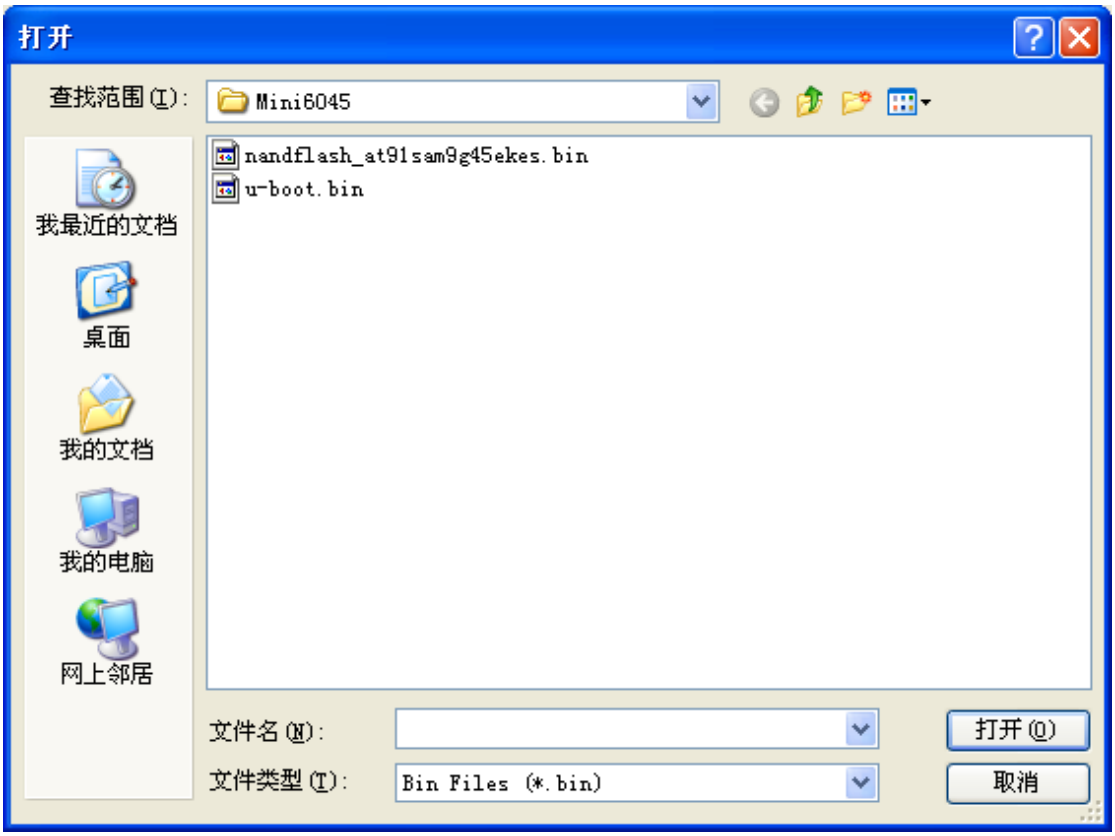


Figure 5.3.15 SAM-BA burn uImage binary file

➢ Open the "***Send File Name***" browse window, then you should select "***All Files (*.*)***" in the "***files of type***", select "***uImage***",as shown in the figure below.

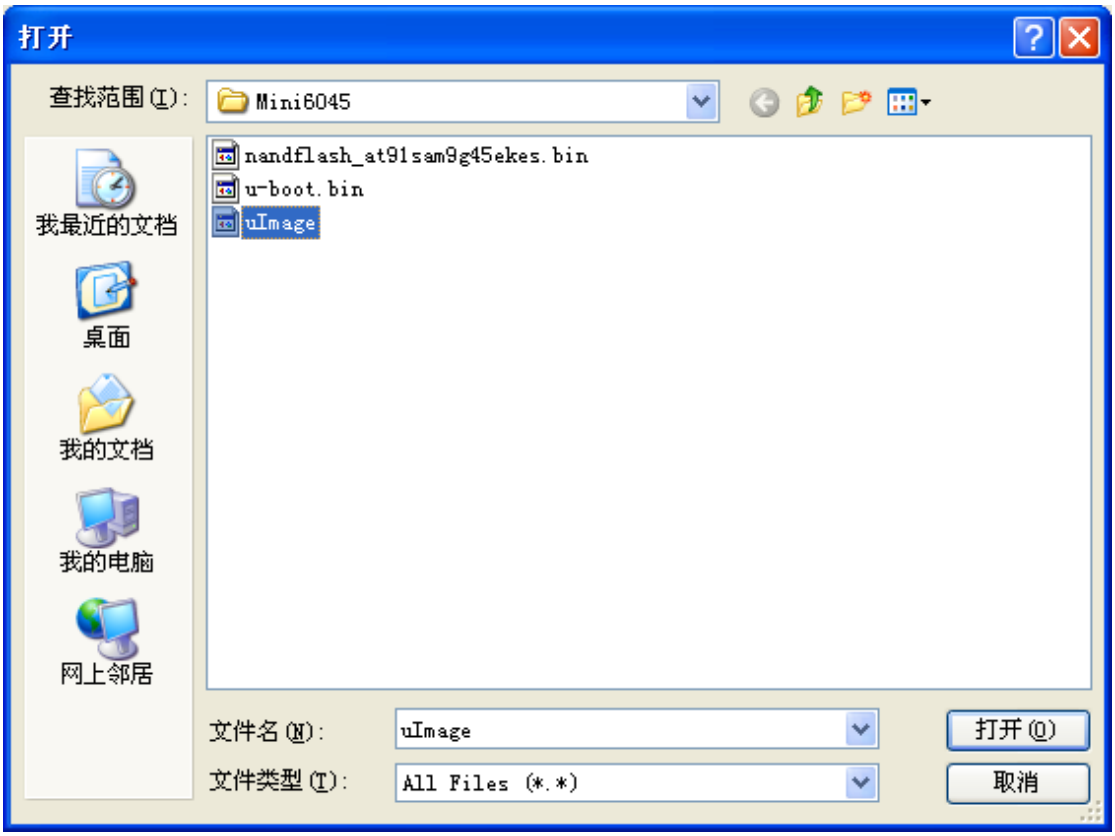


Figure 5.3.1.16 SAM-BA burn uImage to nandflash

- Click "***Send File***" button to burn "uImage" to nandflash.

9.3.4 Burn the Image of the fourth booting stage –file system

- Make target board connect to network.
- Set tftpd server and download folder. Copy tftpd.exe in the CD's ***02 Linux2.6 Kit/02 Tools*** folder to your PC.

Figure 5.3.17 Tftpd.exe software icon

- Double click "*tftpd.exe* ", the following picture will appear on the screen.

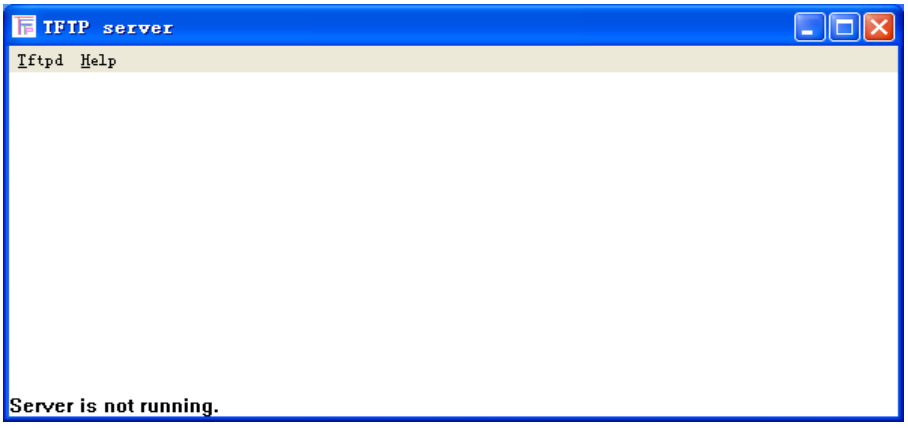


Figure 5.3.18 Tftpd.exe open interface

- Click "*Tftpd* ", and click the option "*Configure* " in its pulldown menu.

Figure 5.3.19 Tftpd.exe config interface

- Press the button *Browse*, the following picture will appear on the screen, select "image record", and click "*OK* " button.

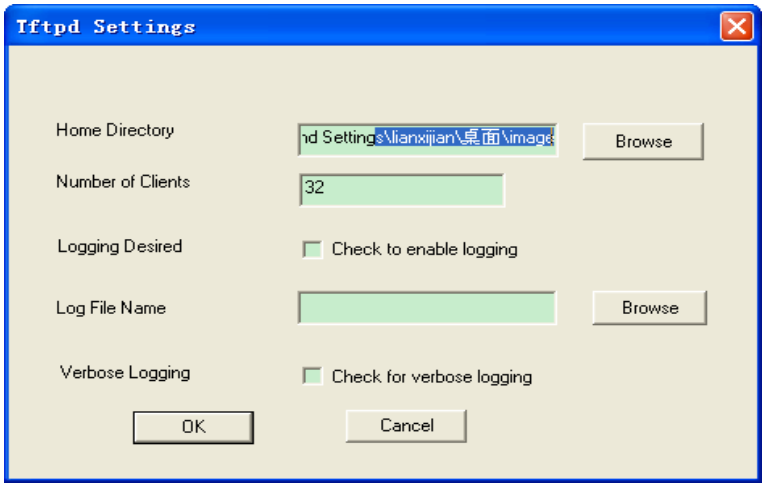


Figure 5.3.20 Tftpd.exe config interface

- Click "*Tftpd* ", and click the option "*Start* " in its pull-down menu.

Figure 5.3.21 startup tftpd server

- The TFTP Server set OK.

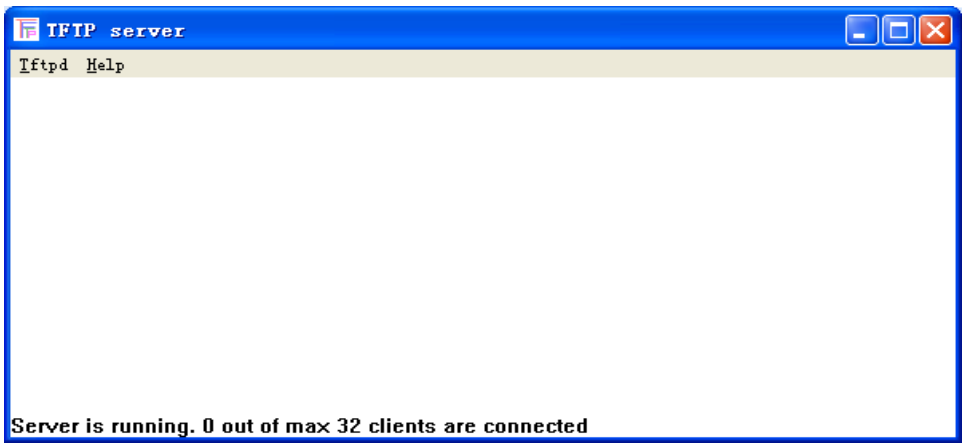


Figure 5.3.22 Tftpd server running

- Turn on the target board power, when the U-Boot enter the countdown, press the space key of the keyboard. Then U-Boot enter download image mode.

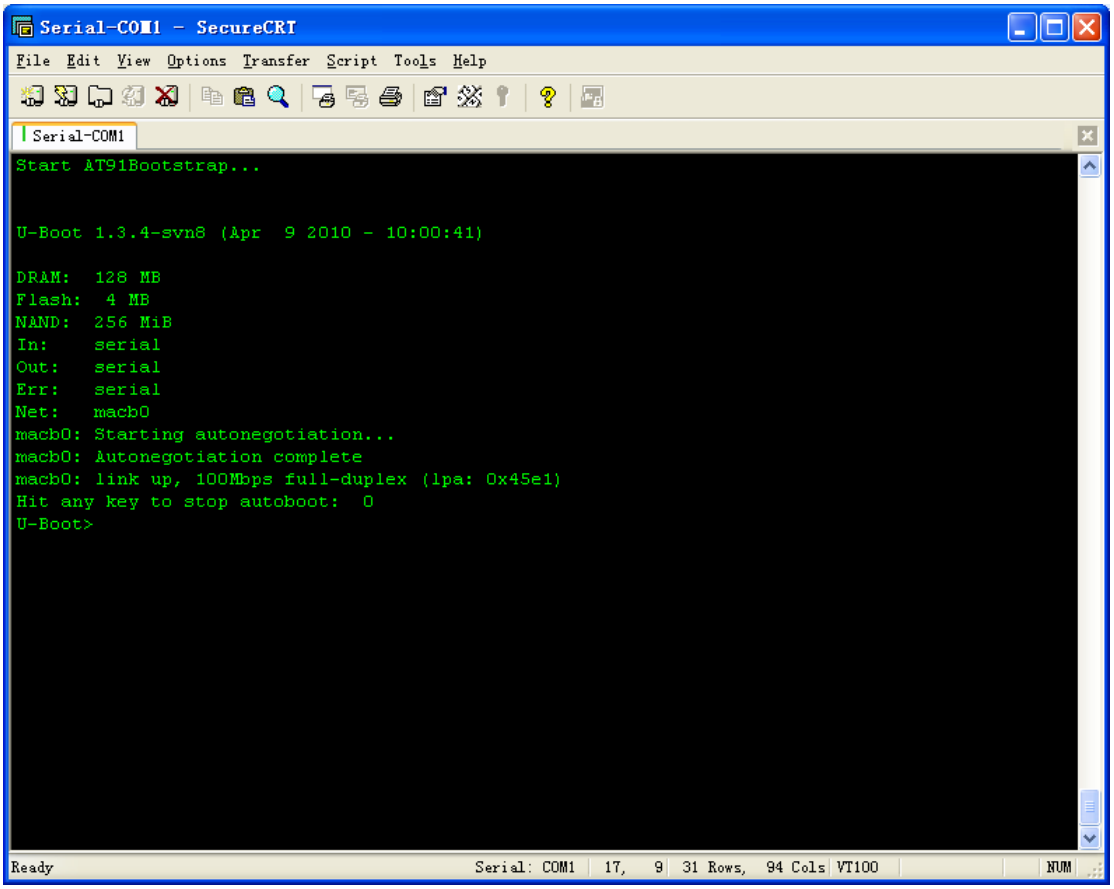


Figure 5.3.23 U-boot startup interface

- Set the target board IP and server IP, gateway IP in the U-boot

```
U-Boot> setenv serverip 192.192.192.71
U-Boot> setenv ipaddr 192.192.192.200
U-Boot> setenv ethaddr 00:11:22:33:44:55
U-Boot> saveenv
```

- Erase the nandflash space from 0x3a0000

```
U-Boot> nand erase 0x3a0000
U-Boot> nand scrub 0x3a0000
```

- Use the nand write.yaffs command to download the uImage the nandflash.

```
U-Boot> tftp 0x20000000 rfs-qtopia.yaffs2
```

- Copy the rootfs to nandflash .

```
U-Boot> nand write.yaffs 0x20000000 0x3a0000 $(filesize)
```

- The file system has been burned to the nandflash. You can reset the power.

10 QT Demo

You can enter the following command to start Qtopia application process.

1. Enter the following command procedures for the implementation of touch screen calibration:

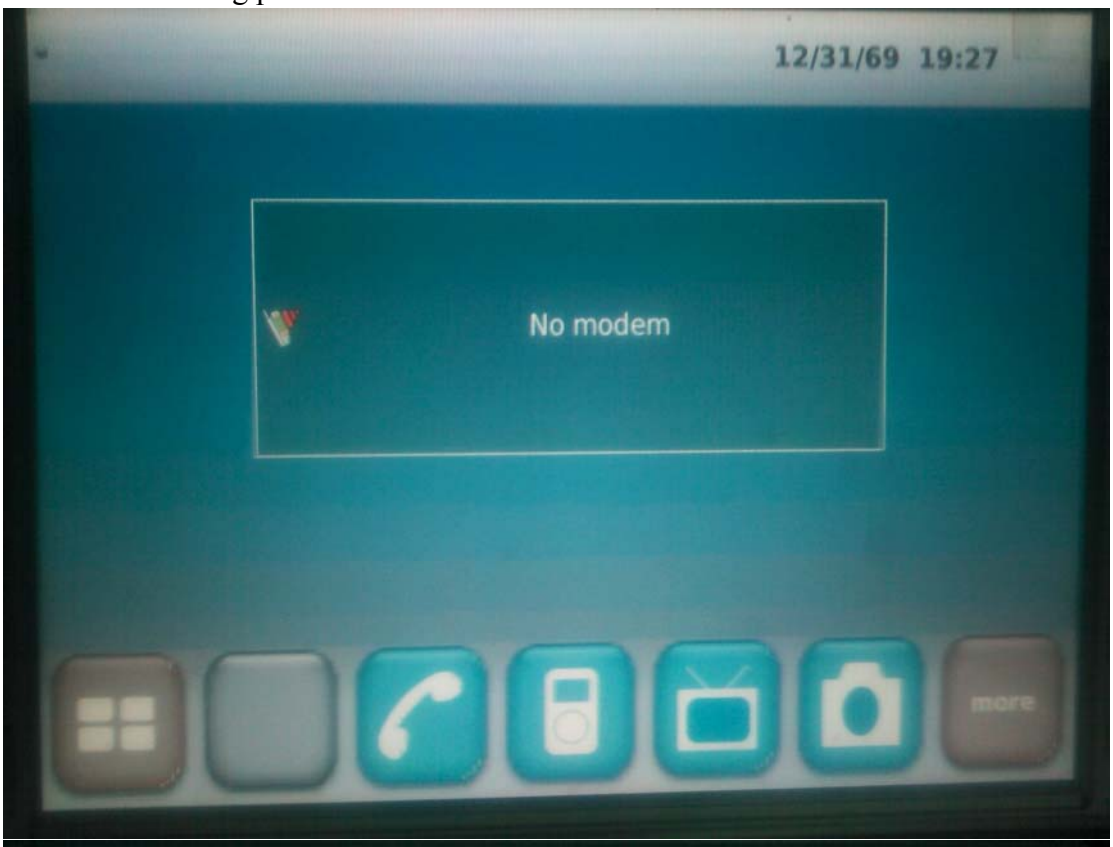
```
[root@Mini6045:/]# ts_calibrate
```

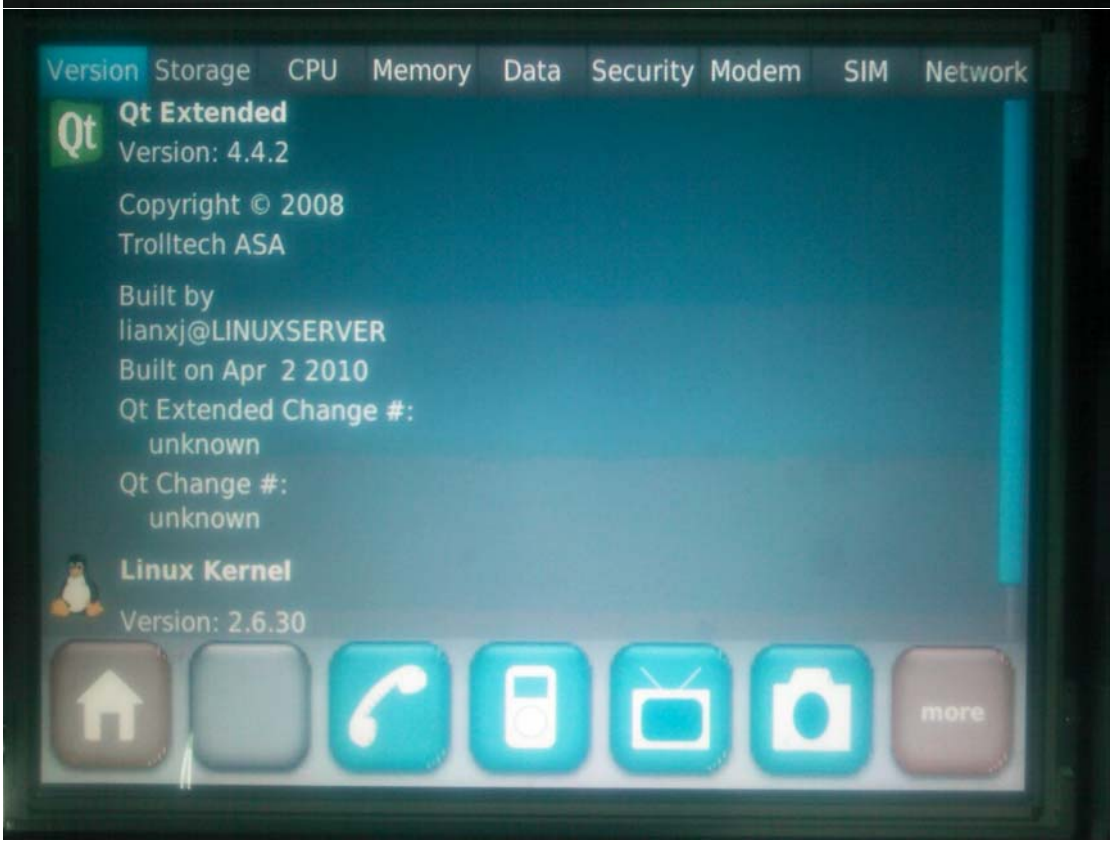
Follow the on-screen prompts, click the “+” icon five times to complete the calibration.

2. you can start the Qtopia application process with the following command.

```
[root@Mini6045:/]# qpe
```

Then the following pictures will be shown.





Chapter Four: Introduction of Wince6.0 System

11.1 Image files related to SBC6045 WinCE 6.0 system

If WinCE system is customized using SBC6045 WinCE 6.0 BSP that we provide and the compilation is successfully finished, the system will generate 6 image files, i.e.: FIRSTBOOT.nb0, EBOOT.nb0, NK.nb0, FIRSTBOOT.bin, EBOOT.bin, NK.bin, of which 4 files are usually used in burning processes, i.e.: FIRSTBOOT.nb0, EBOOT.nb0, NK.nb0, NK.bin. The files generated in .nb0 format will finally be burnt to Dataflash or NAND flash, and they can directly run in SDRAM; while the files in .bin format must first be converted into .nb0 files by EBOOT running on SBC6045 main board nb0, then they are burnt to Dataflash or NAND flash.

11.2 Principle of SBC6045 WinCE 6.0

At prsent SBC6045 WinCE 6.0 BSP Support NAND flash boot 。booting flow chart as follow:

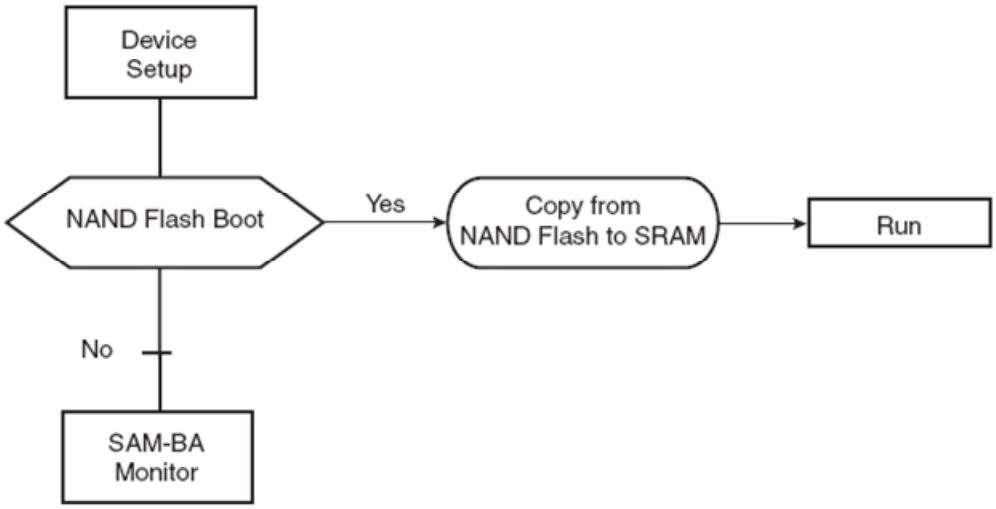


Figure11.2.1

The ROOMBOOT Code fixed inside the CPU will automatically running after power on，The ROMBOOT will check if there is a valid BOOTLOADER in nandflash.If yes the ROMBOOT programer will copy the BOOTLODER to the SRAM inside of the CPU and execute it .otherwise it will ignore the nand flash and jump to the Serial port download and excute program .

11.3 Principles on the booting of SBC6045 WinCE 6.0 system

After power on the system is fixed inside CPU of AT91SAM9G45, ROMBOOT will automatically copy FIRSTBOOT image, the first-level user booting code from NANDflash 0x00000000 address to SRAM inside of AT91SAM9G45 and execute it. FIRSTBOOT's role is to initialize SDRAM memory, NANDflash in AT91SAM9G45, and copy EBOOT, the second-level user booting code from NANDflash 0x00020000 address of SBC6300X main board to SDRAM of AT91SAM9G45 main board and execute it; FIRSTBOOT also copy Logo from NANDflash 0x00080000 address to SDRAM. In default state, EBOOT will automatically copy WinCE system image NK from NAND flash 0x00200000

address to SDRAM, and hand over system control to operating system. In addition, EBOOT undertakes the management operations of underlying hardware and settings of the data shared with operating system.booting flow chart as figure 11.3.2.

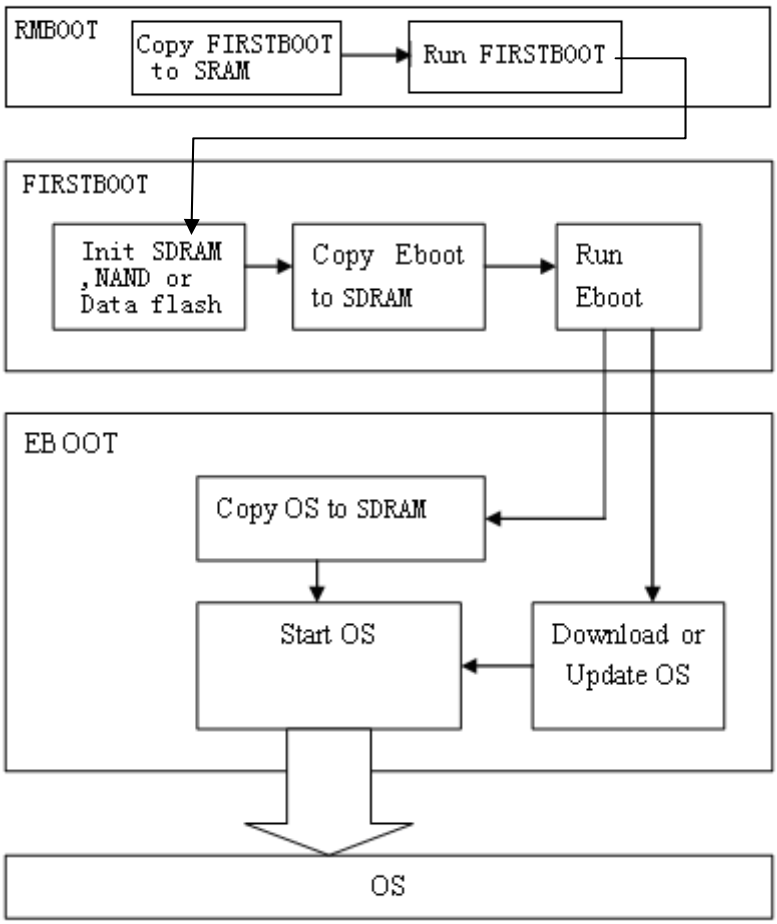


figure 11.3.2

NANDFLASH memory mapping as follow：

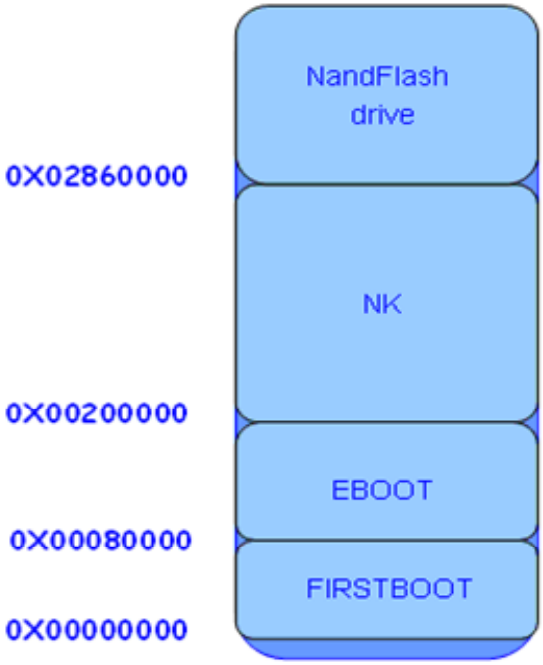


Figure 11.3.3

12 Charpter 12 Burning of WinCE system

12.1 Introduction of buring Image of SBC6045 WinCE 6.0

Now our SBC6045 WinCE 6.0 BSP supports two burning modes, first, burn FIRSTBOOT, EBOOT and WinCE system image NK using the SAM-BA software that ATMEL provides; second, connect VS2005 WinCE 6.0 development environment installed on client development workstation or other TFTP servers (e.g.: CEDownload.exe) to SBC6045 main board, burn WinCE system image files NK via net cable using the EBOOT on SBC6045 (the EBOOT that SBC6045 WinCE 6.0 BSP of current version generates doesn't support for the burning of user booting codes FIRSTBOOT and EBOOT, it can only burn WinCE system image file NK.bin) .

Important: if you use EBOOT, the user booting code on SBC6045 main board to WinCE system image file NK, the actual process will be, EBOOT, the user booting code on SBC6045 main board will first download WinCE system image file NK.bin that VS2005 WinCE 6.0 generates from TFTP server running on development workstation to SDRAM onSBC6045 main board via net cable, then the file will be converted into NK.nb0 before being burnt to NAND flash. The TFTP server mentioned here can be the server provided in VS2005 WinCE 6.0 development environment or other TFTP servers. Please note that the port parameter of the TFTP server that you use is 980 instead of 69, the standard TFTP port. The software CEDownload.exe, which we will describe in Section 3.4 below is a TFTP server software, which has changed the default TFTP port from 69 into 980.

12.2 Burn SBC6045 WinCE 6.0 image through SAM-BA

12.2.1Install SAM-BA software

Install the application \02 Linux 2.6 Kit\02 Tools \Install AT91-ISP v1.13.exe in SBC6045 CD on your development workstation as the default path and configurations of AT91-ISP v1.13.exe program. After the installation is finished, you will see the icon of SAM-BA v2.9 (see Figure 12.2.1) appearing on the desktop :

Figure 12.2.1

- Connect the Debug serial COM port.
- Connect USB device port to USB Host of the development workstation using the USB cable..
- Open the hyper terminal on the PC and setting as :115200 8n1 no CRC and no flow control.
- Remove the jumper cap of J4、J10 and J1 before power on .
- Double click the icon of the application SAM-BA v2.9on desktop.

Figure 12.2.1 SAM-BA v2.9

As shown in Figure 12.2.1 to run SAM-BA 2.9 program，and select"***Select the connection***"and"***\usb\ARM0***"from the pulldown menu as shown in Figure 12.2.2.

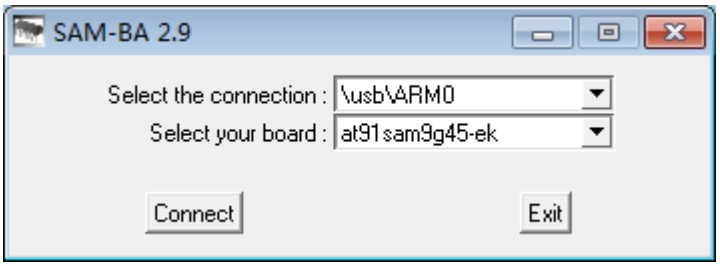


Figure 12.2.2 SAM-BA

Click "***Connect***" button as shown in Figure 12.2.2,enter the interface as show in Figure 12.2.3 below.

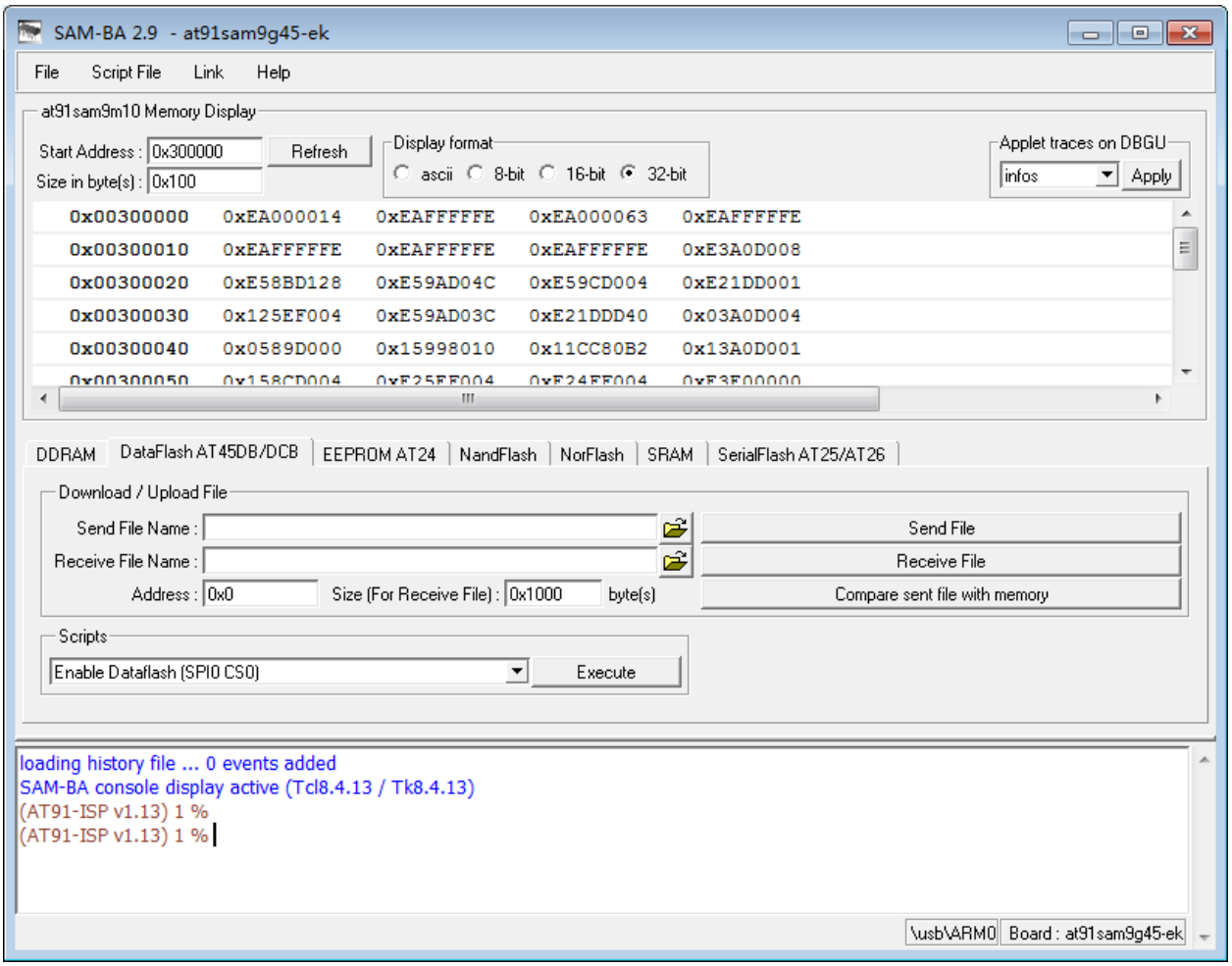


Figure 12.2.3

1. Connect the jump J4 .As show in Figure 12.2.4 in the Scripts pulldown menu of SAM-BA v2.9, select Enable NandFlash, and click Execute button in the column Scripts to enable NAND flash on SBC6045 board. After the Enable operation is successful, the interface as shown in Figure 12.2.4 will appear:

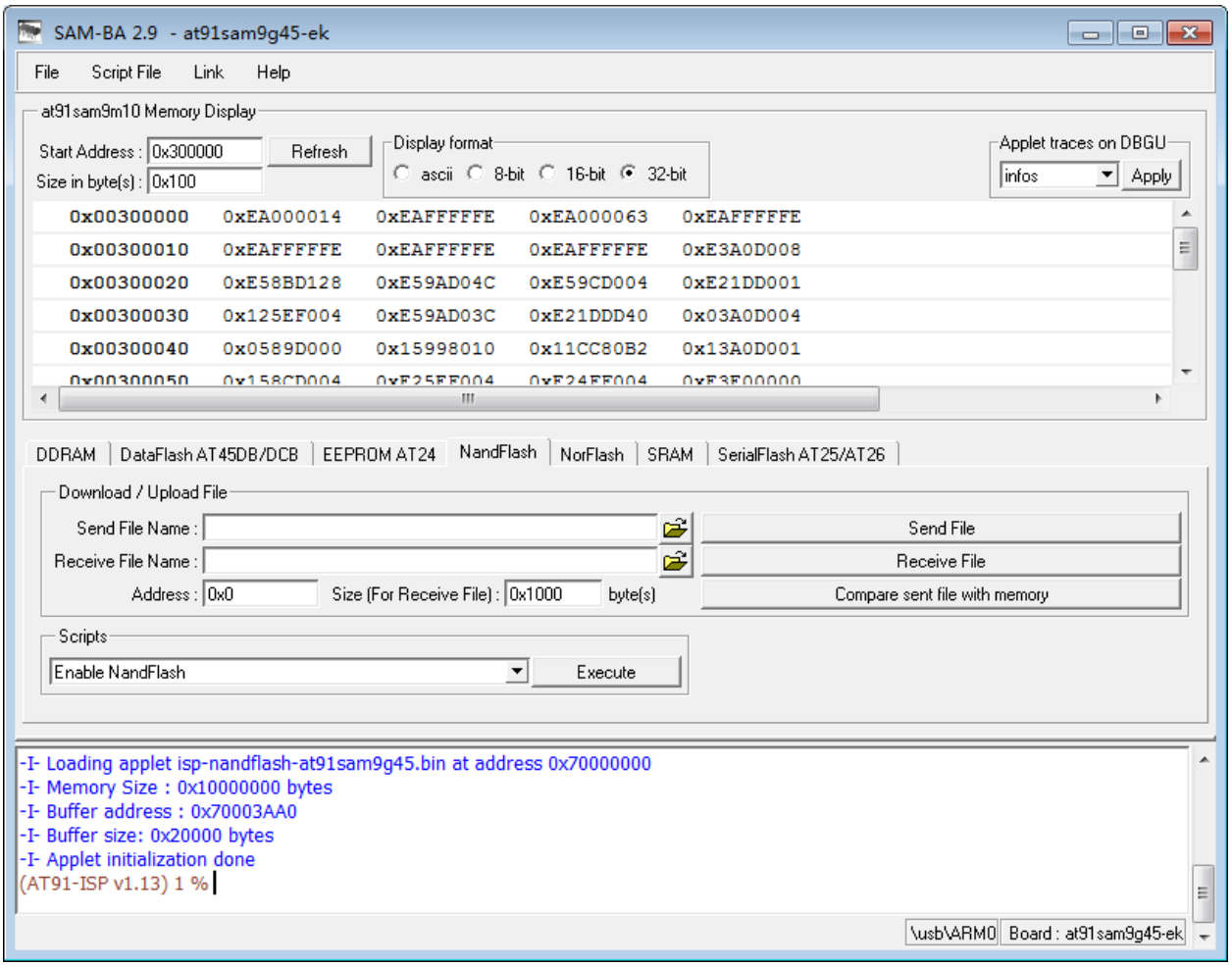


Figure 12.2.4

2. As shown in Figure 12.2.5 in the Scripts pulldown menu of SAM-BA v2.9, select Erase All, click Execute button in SAM-BA v2.9, SAM-BA v2.9 will automatically erase entire NAND flash. After the Erase operation is successful, the interface as shown in Figure 12.2.5 .

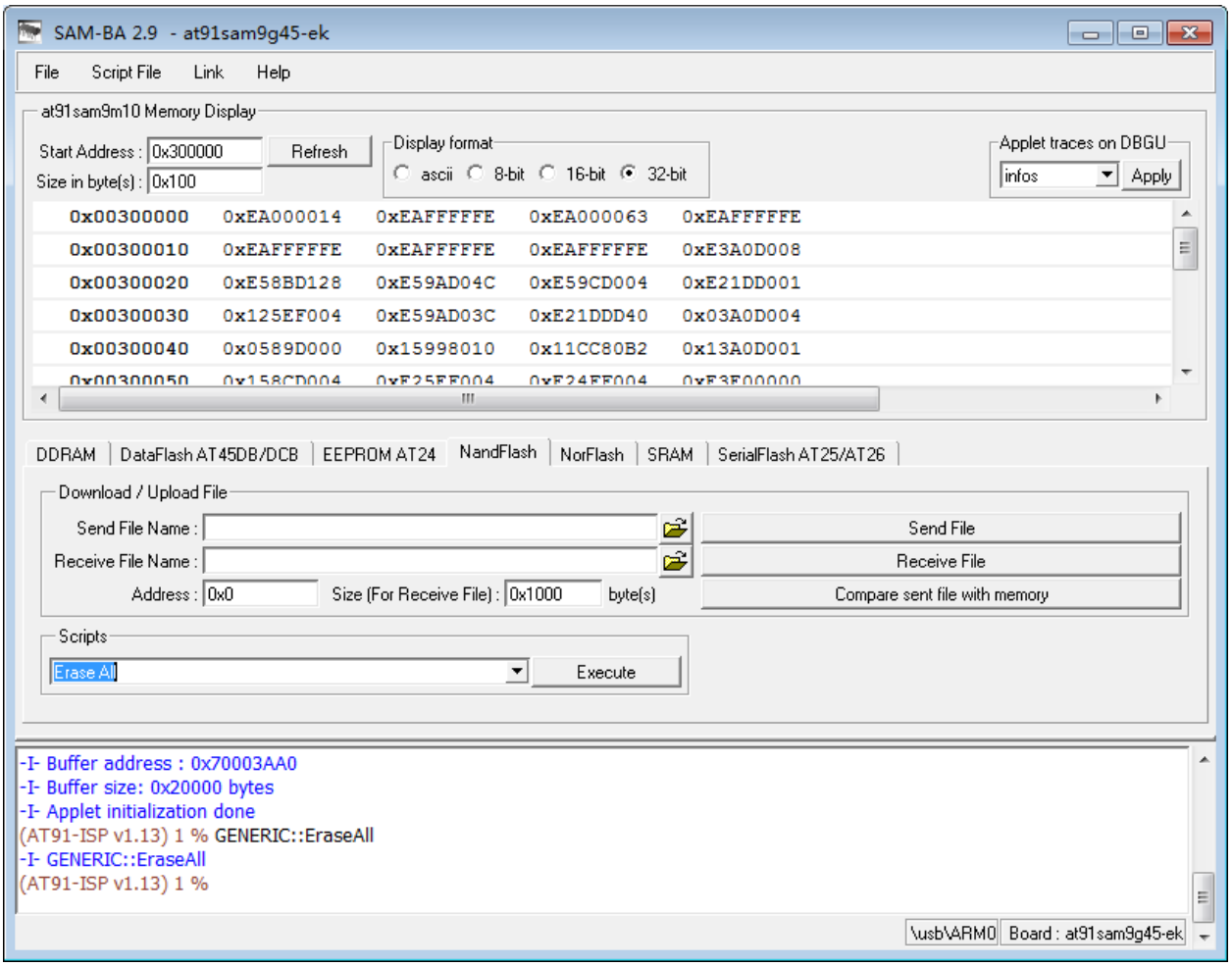


Figure 12.2.5

3. Select Send Boot File button in the Scripts pulldown menu of SAM-BA v2.9, click Execute button in SAM-BA v2.9, and open file dialog box as shown in Figure 12.2.6 will pop up in SAM-BA2.9

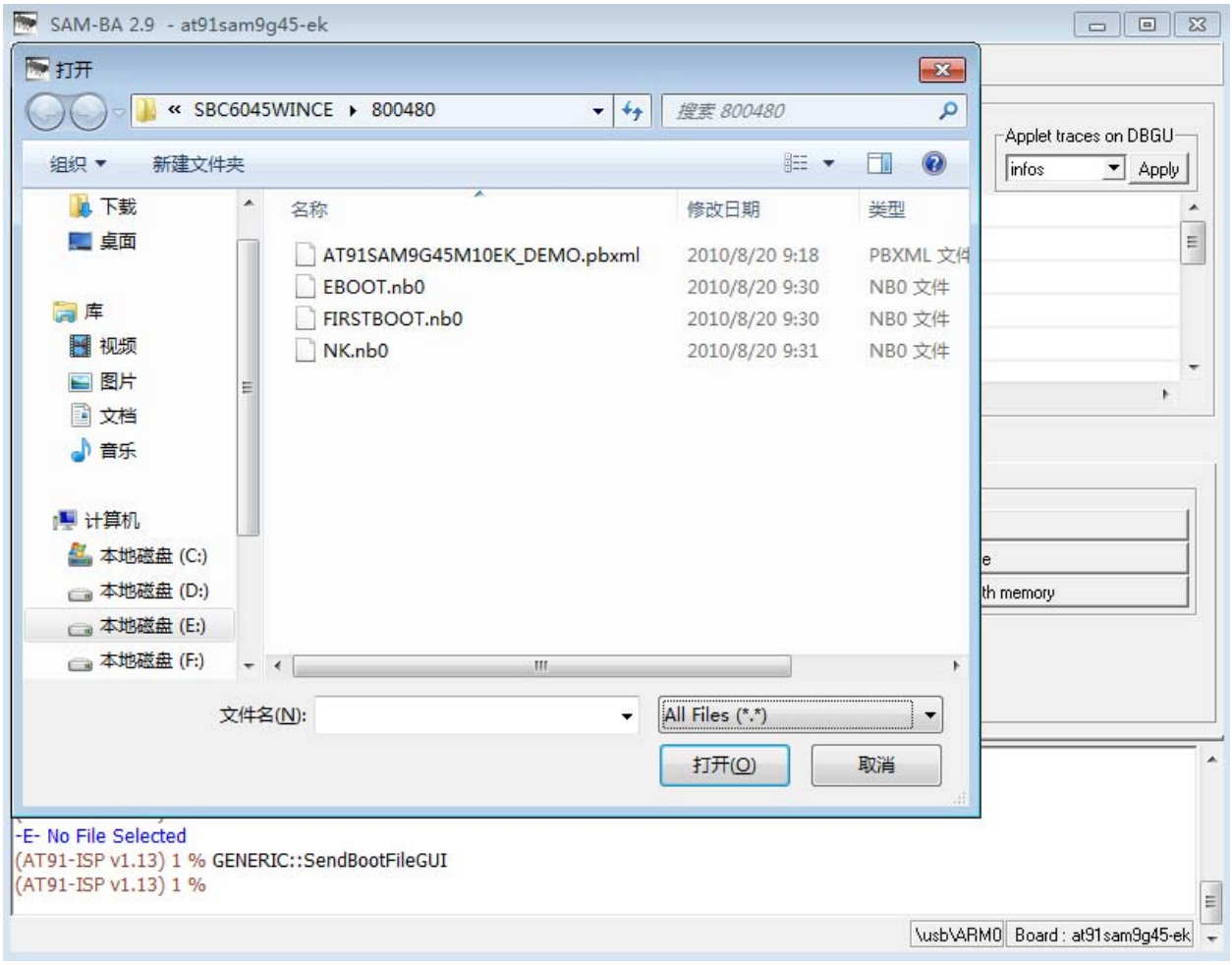


Figure 12.2.6

4. As shown in Figure 12.2.6, select FIRSTBOOT.nb0 file under the path \03 WinCE 6.0 Kit\00 Image\ in SBC6045 CD in the open file dialog box of SAM-BA v2.9, then click Open button in open file dialog box of SAM-BA v2.9, SAM-BA v2.9 will automatically start burning FIRSTBOOT.nb0 file to the beginning of 0x00000000 address of NAND flash on SBC6045 board. After the burning is successful, the interface as shown in Figure 12.2.7 will appear.

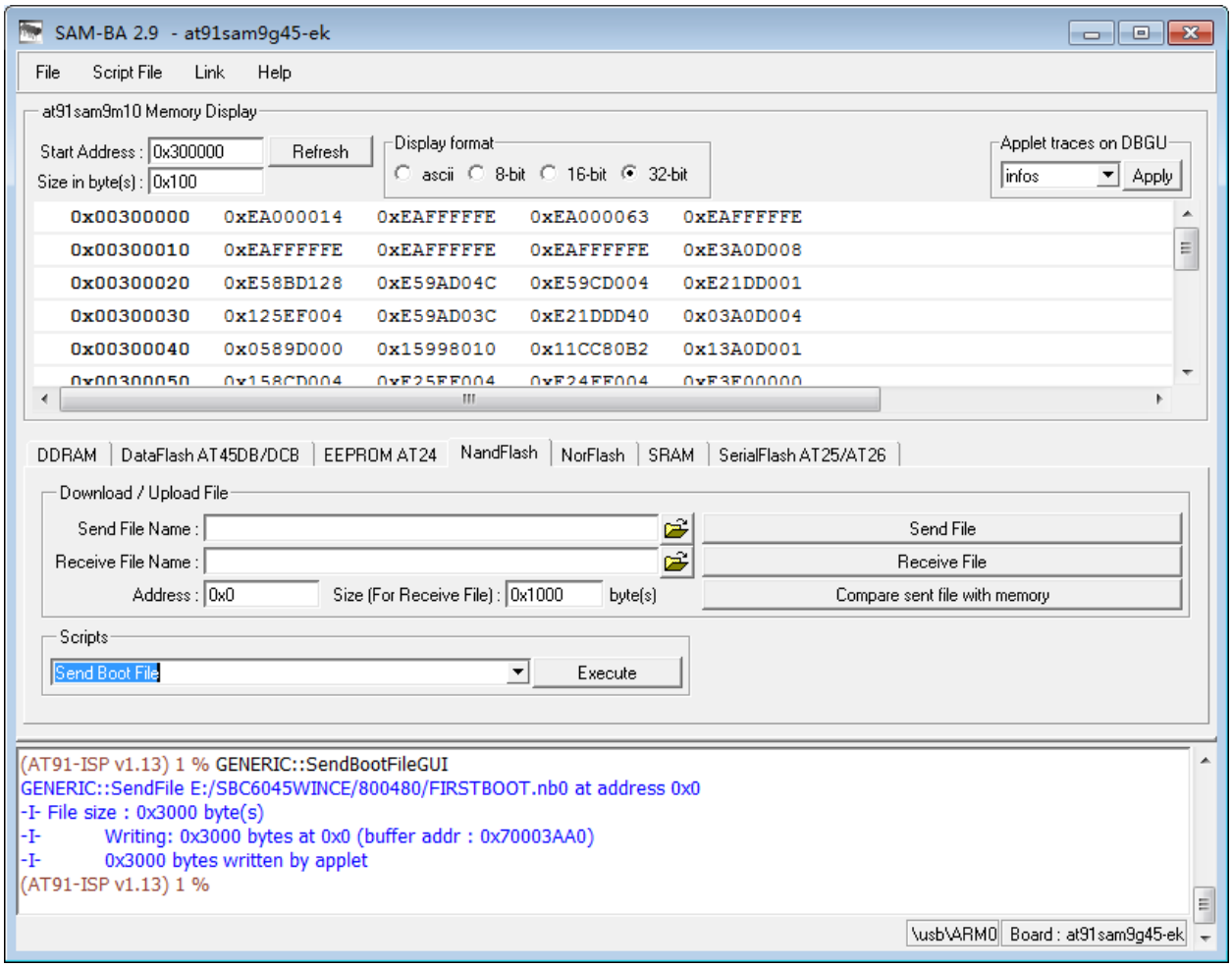


Figure 12.2.7

5. As shown in Figure 12.2.8, enter address 0x80000 in the Address: field in Download/Upload File of SAM-BA v2.9. Select SBC6045 CD \03 WinCE 6.0 Kit\00 Image \EBOOT.nb0 file in the text box Send File Name:, then click Send File button in Download/Upload File of SAM-BA v2.9, SAM-BA v2.9 will start burning EBOOT.nb0 file to the beginning of 0x80000 address of NAND flash on SBC6045 board, After the burning is successful, the interface as shown in Figure 12.2.9 will appear.

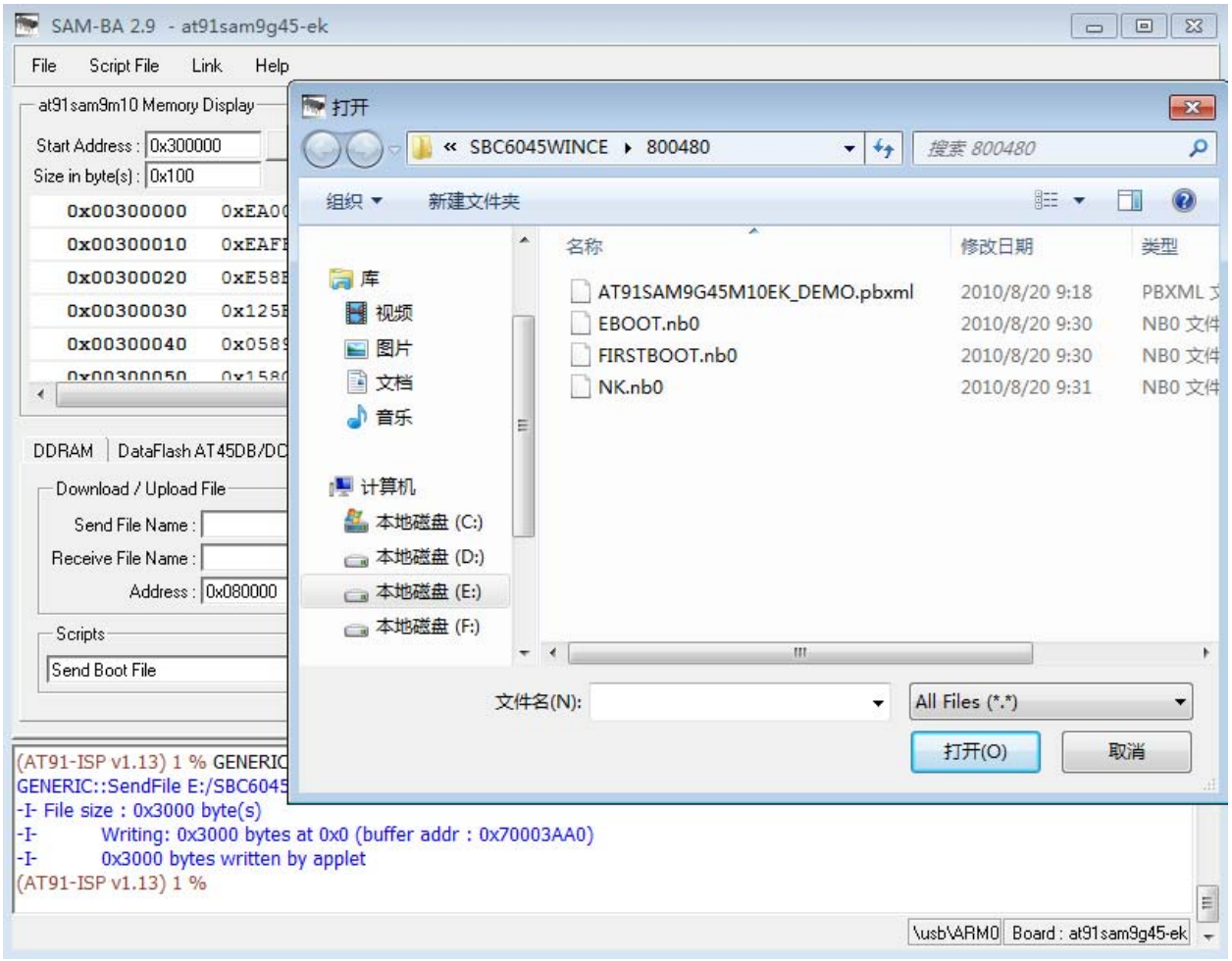

SAM-BA 2.9 - at91sam9g45-ek
File
Script File
Link
Help
at91sam9m10 Memory Display
Start Address : 0x300000
Size in byte(s) : 0x100
0x00300000
0x00300010
0x00300020
0x00300030
0x00300040
DDRAM
DataFlash AT45DB/DC
Download / Upload File
Send File Name :
Receive File Name :
Address : 0x080000
Scripts
Send Boot File
(AT91-ISP v1.13) 1 % GENERIC
GENERIC::SendFile E:/SBC6045
-I- File size : 0x3000 byte(s)
-I- Writing: 0x3000 bytes at 0x0 (buffer addr : 0x70003AA0)
-I- 0x3000 bytes written by applet
(AT91-ISP v1.13) 1 %
\usb\ARM0
Board : at91sam9g45-ek
打开
SBC6045WINCE ▸ 800480
搜索 800480
组织
新建文件夹
名称
修改日期
类型
库
视频
图片
文档
音乐
计算机
本地磁盘 (C:)
本地磁盘 (D:)
本地磁盘 (E:)
本地磁盘 (F:)
AT91SAM9G45M10EK_DEMO.pbxml 2010/8/20 9:18 PBXML
EBOOT.nb0 2010/8/20 9:30 NB0 文件
FIRSTBOOT.nb0 2010/8/20 9:30 NB0 文件
NK.nb0 2010/8/20 9:31 NB0 文件
文件名(N):
All Files (*.*)
打开(O)
取消

Figure 12.2.8

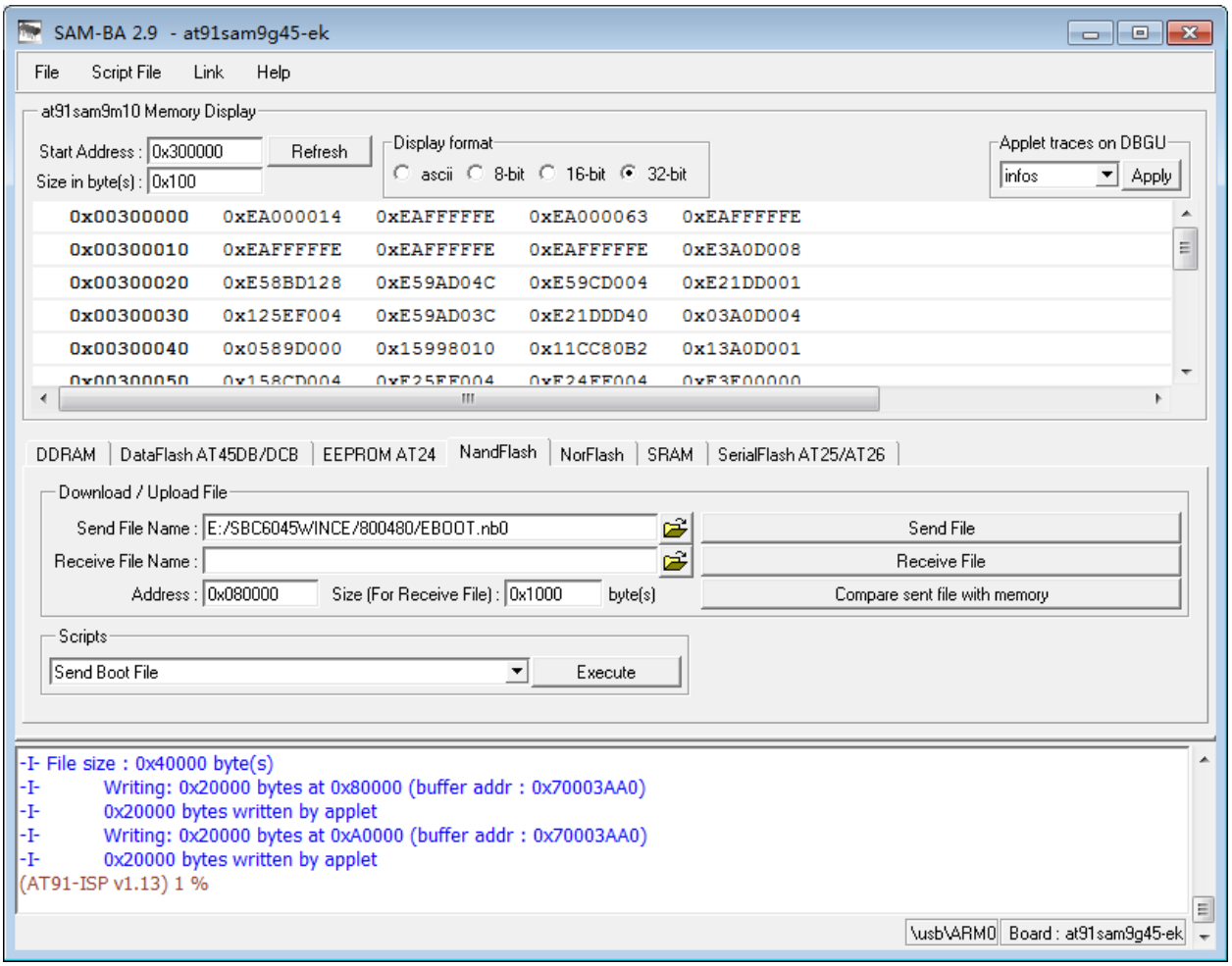


Figure 12.2.9

6. As shown in Figure 12.2.10, enter the address 0x000200000 in the Address: field in Download/Upload File of SAM-BA v2.9, select SBC6045 CD \03 WinCE 6.0 Kit\00 Image \NK.nb0 file in the text box Send File Name:, then click Send File button in Download/Upload File of SAM-BA v2.9, SAM-BA v2.9 will start burning NK.nb0 file to the beginning of 0x000200000 address of NAND flash on SBC6045 board. After the burning is successful, the interface as shown in Figure 12.2.11 will appear.: (it takes 3-10 minutes to burn NK.nb0 file.) .

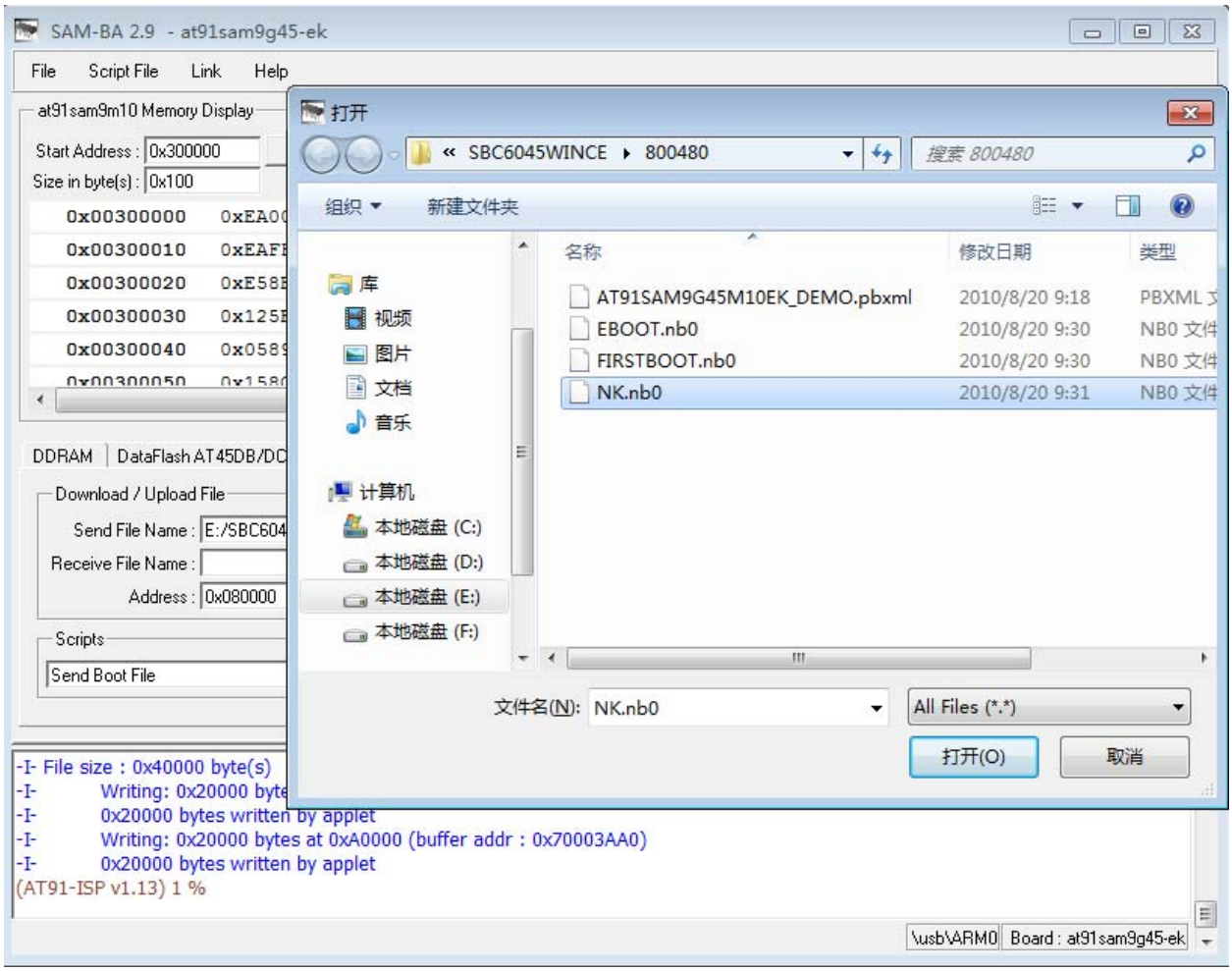


Figure 12.2.10

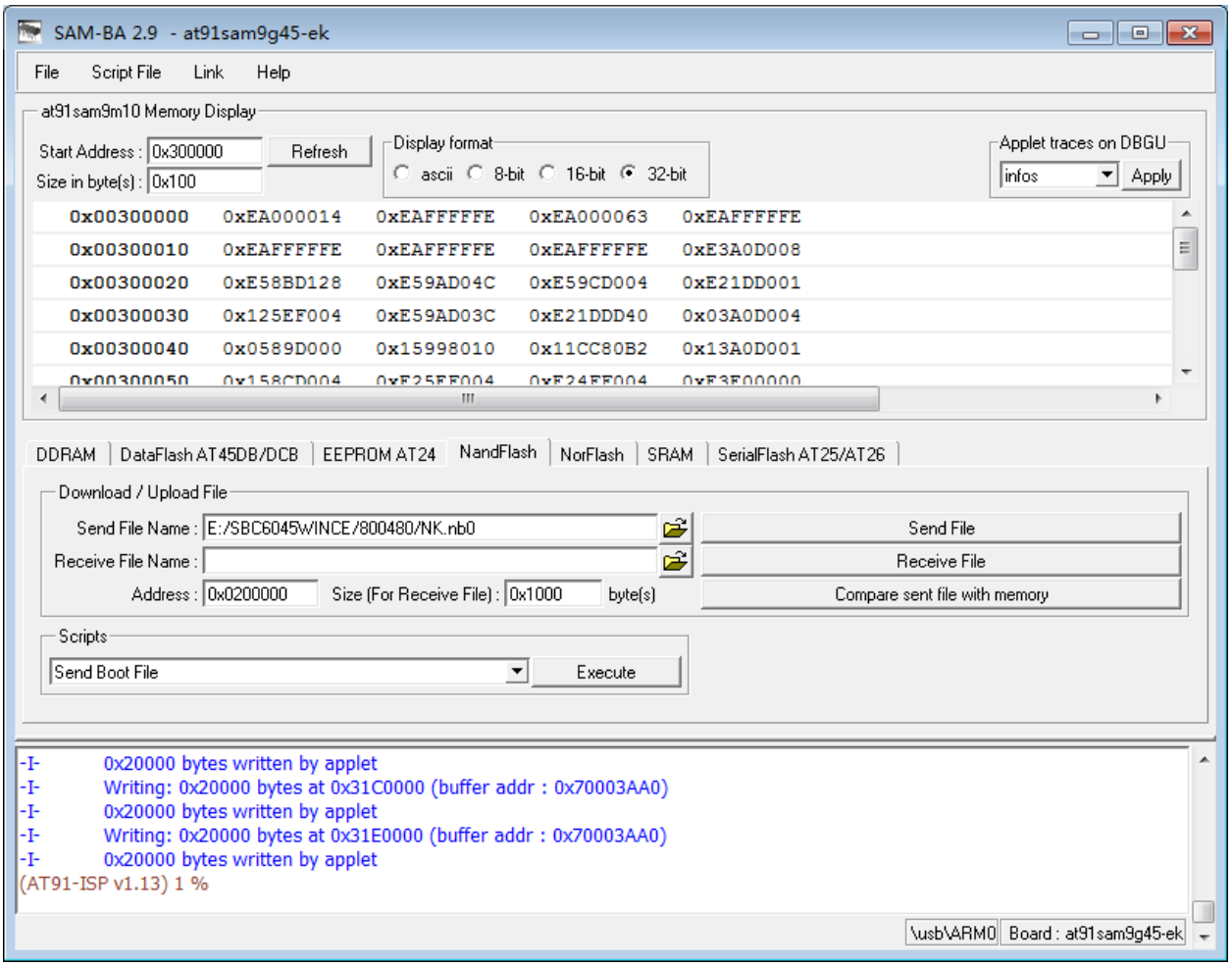


Figure 12.2.11

12.3 Burn WinCE 6.0 NK image files through TFTP server software CEDownload.exe

In effect, both CEDownload.exe and VS2005 WinCE 6.0 development environment as described are TFTP servers, and the default port No. of TFTP server has been changed from standard 69 into 980. This Section expounds how to update WinCE 6.0 operating system image file NK of through CEDownload.exe of SBC6045.

1. Connect Debug serial port J23 of SBC6045 to serial port of development workstation using serial port cable supplied with SBC6045. Run SBC6045 CD \03 WinCE 6.0 Kit\04 Tools \dnw.exe in development workstation,setting the communication parameter as 115200 8N1.
2. On development workstation runningSBC6045CD\03 WinCE 6.0 Kit\04 Tools\CEDownload.exe as Figure 12.3.1show:

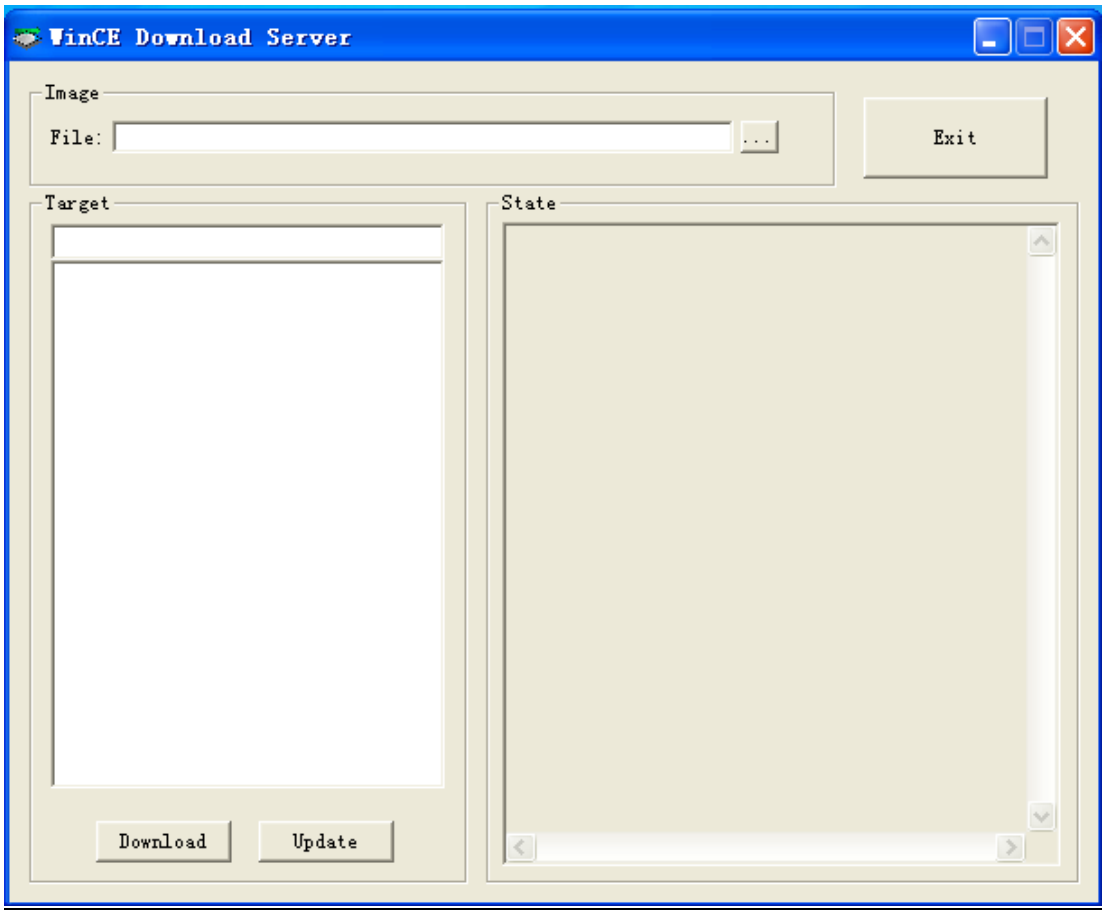


Figure 12.3.1

3. As shown in Figure 12.3.1, select NK.bin regenerated by SBC6045 WinCE 6.0 project or the NK.bin File regenerated by SBC6045WinCE 6.0 project .Here I select NK.bin file 6.0 NK.bin file provided in CD in. As shown in Figure 12.3.2, select NK.bin file, the interface of CEDowload.exe will appear as shown in Figure 12.3.2.

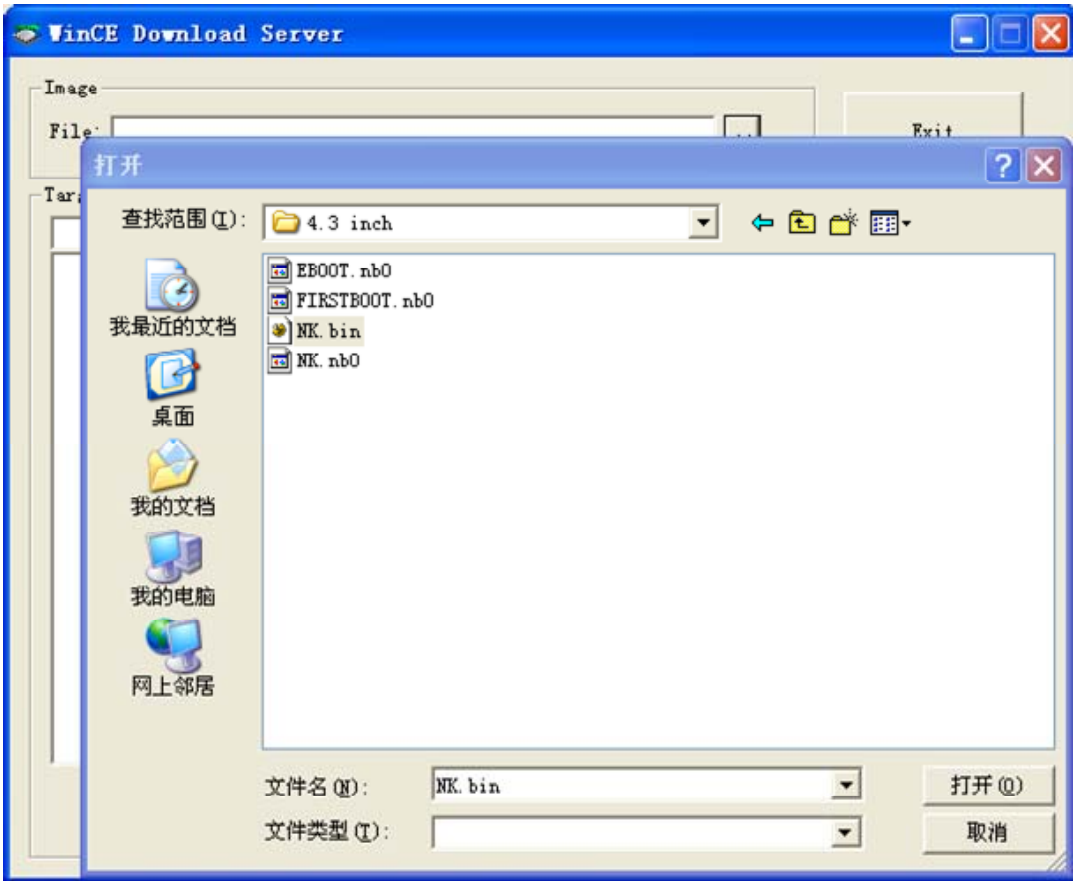


Figure 12.3.2

4. Power on SBC6045,enter space key enter EBOOTmenu setting the SBC6045 config as follow figure show :

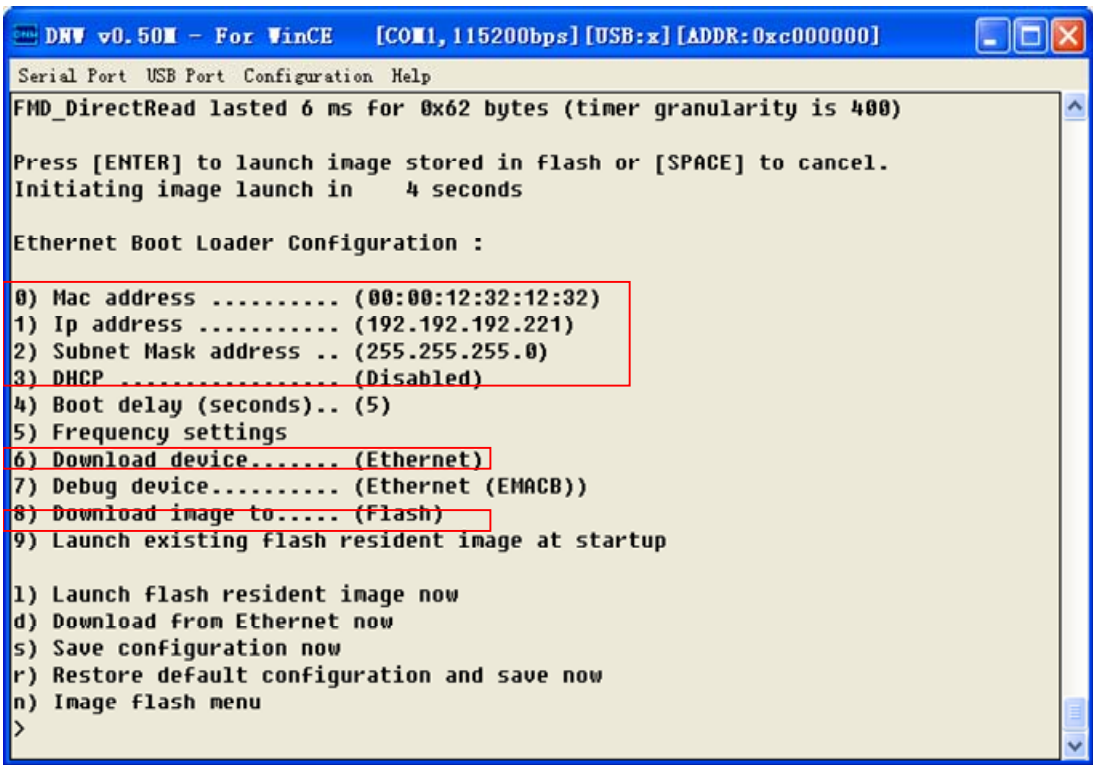

DNW v0.50 - For WinCE [COM1,115200bps][USB:x][ADDR:0xc000000]
Serial Port USB Port Configuration Help
FMD_DirectRead lasted 6 ms for 0x62 bytes (timer granularity is 400)
Press [ENTER] to launch image stored in flash or [SPACE] to cancel.
Initiating image launch in 4 seconds
Ethernet Boot Loader Configuration :
0) Mac address ..... (00:00:12:32:12:32)
1) Ip address ..... (192.192.192.221)
2) Subnet Mask address .. (255.255.255.0)
3) DHCP ..... (Disabled)
4) Boot delay (seconds).. (5)
5) Frequency settings
6) Download device..... (Ethernet)
7) Debug device..... (Ethernet (EMACB))
8) Download image to..... (Flash)
9) Launch existing flash resident image at startup
l) Launch flash resident image now
d) Download from Ethernet now
s) Save configuration now
r) Restore default configuration and save now
n) Image flash menu
>

Figure 12.3.3

5. Enter the lowercase letter d in EBOOT menu, the system will start to download WinCE system image file NK.bin to SDRAM of SBC6045 via net cable, you will see theSBC6045 serial port output information as shown in Figure 12.3.4 will appear in DNW tool.

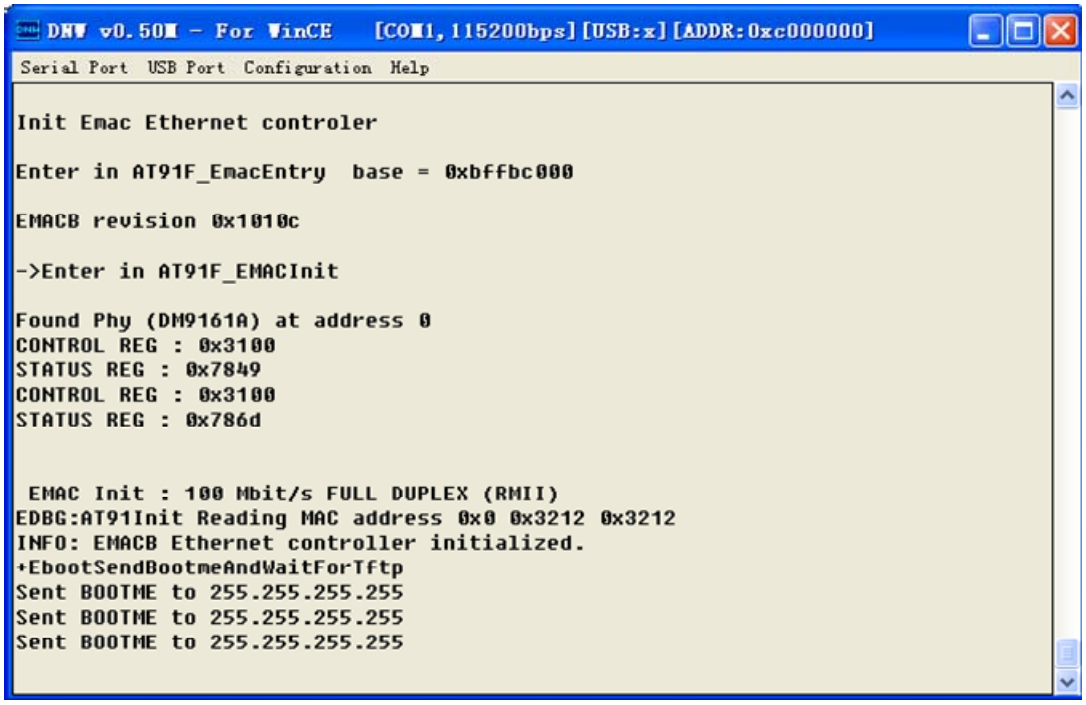

DNW v0.50 - For WinCE [COM1, 115200bps][USB:x][ADDR:0xc000000]
Serial Port USB Port Configuration Help
Init Emac Ethernet controler
Enter in AT91F_EmacEntry base = 0xbffbc000
EMACB revision 0x1010c
->Enter in AT91F_EMACInit
Found Phy (DM9161A) at address 0
CONTROL REG : 0x3100
STATUS REG : 0x7849
CONTROL REG : 0x3100
STATUS REG : 0x786d
EMAC Init : 100 Mbit/s FULL DUPLEX (RMII)
EDBG:AT91Init Reading MAC address 0x0 0x3212 0x3212
INFO: EMACB Ethernet controller initialized.
+EbootSendBootmeAndWaitForTftp
Sent BOOTME to 255.255.255.255
Sent BOOTME to 255.255.255.255
Sent BOOTME to 255.255.255.255

Figure 12.3.4

When you see the following information in DNW Sent BOOTME to 255.255.255.255 As shown in Figure 12.3.4, press Download button in CEDownload.exe software, EBOOT of SBC6045 will start to download NK.bin file to SDRAM via net cable, after the downloading is finished, it will first convert NK.bin file into NK.nb0 file, then burn it into NAND flash, in the end, it will boot WinCE system. Figure 12.3.5 shows the downloading progress appearing in CEDownload software

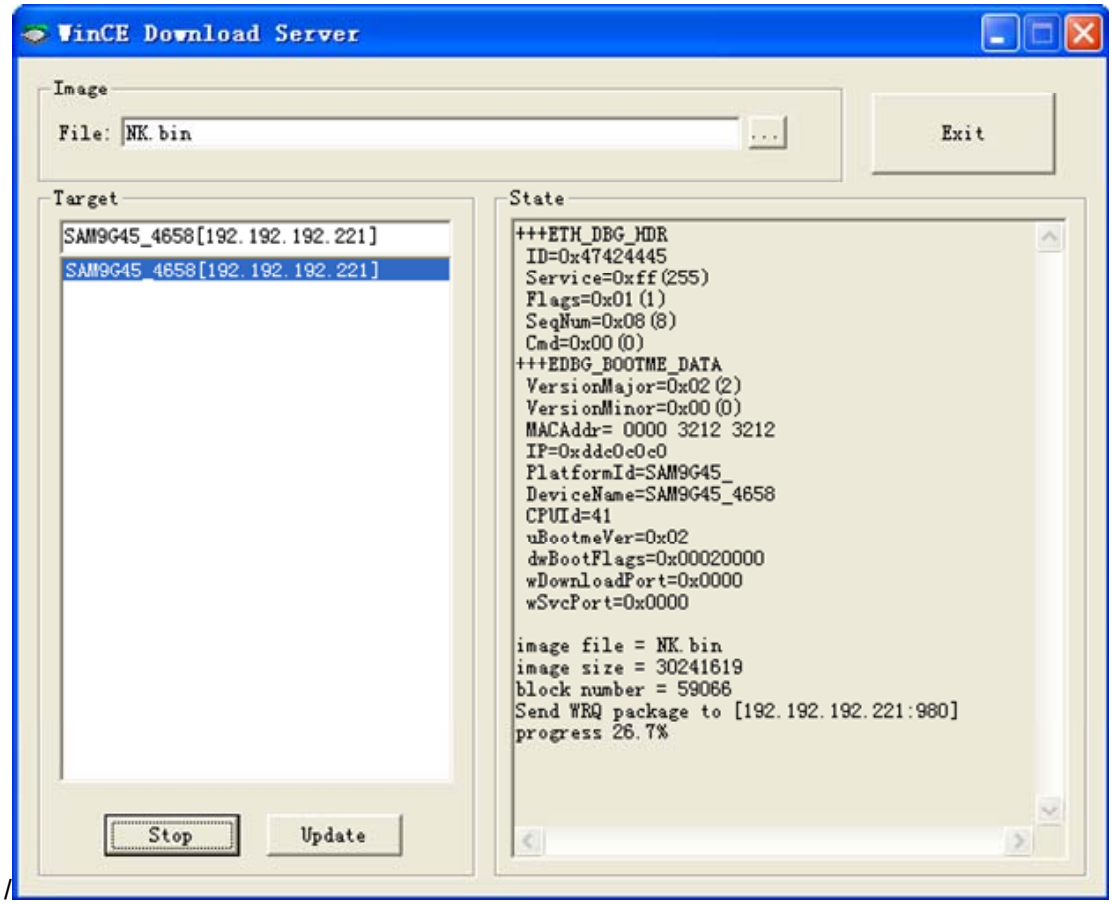
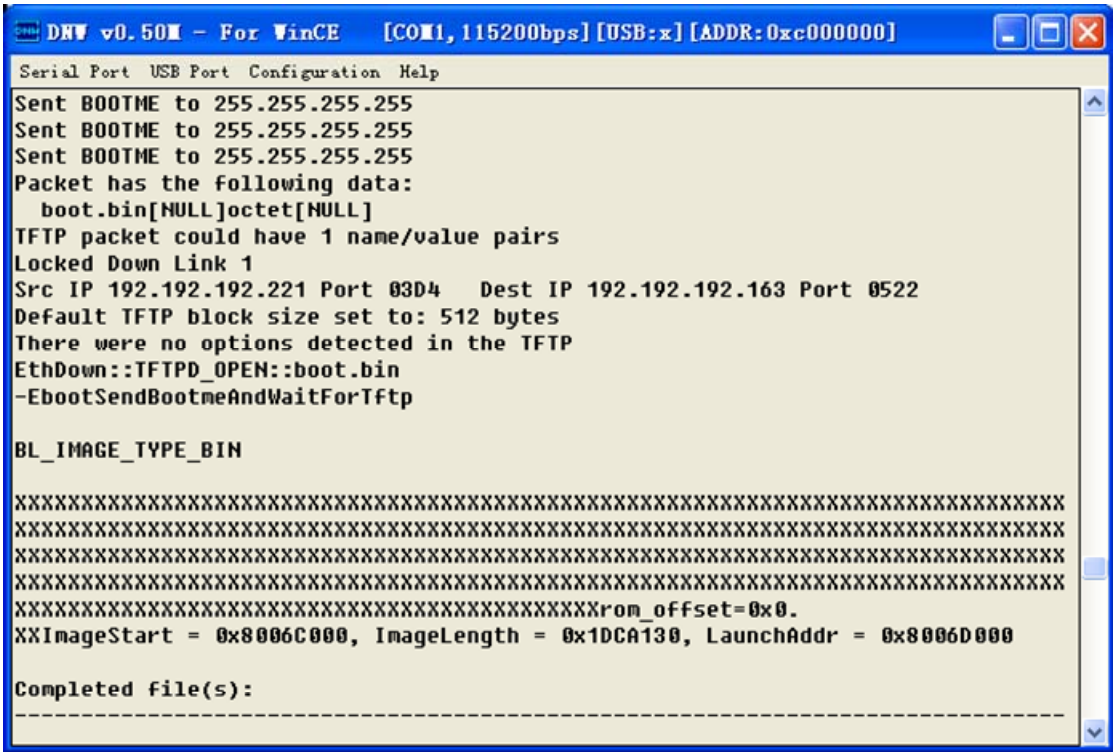


Figure 12.3.5


DNW v0.50 - For WinCE [COM1,115200bps][USB:x][ADDR:0xc000000]
Serial Port USB Port Configuration Help
Sent BOOTME to 255.255.255.255
Sent BOOTME to 255.255.255.255
Sent BOOTME to 255.255.255.255
Packet has the following data:
boot.bin[NULL]octet[NULL]
TFTP packet could have 1 name/value pairs
Locked Down Link 1
Src IP 192.192.192.221 Port 03D4 Dest IP 192.192.192.163 Port 0522
Default TFTP block size set to: 512 bytes
There were no options detected in the TFTP
EthDown::TFTPD_OPEN::boot.bin
-EbootSendBootmeAndWaitForTftp
BL_IMAGE_TYPE_BIN
XXXX

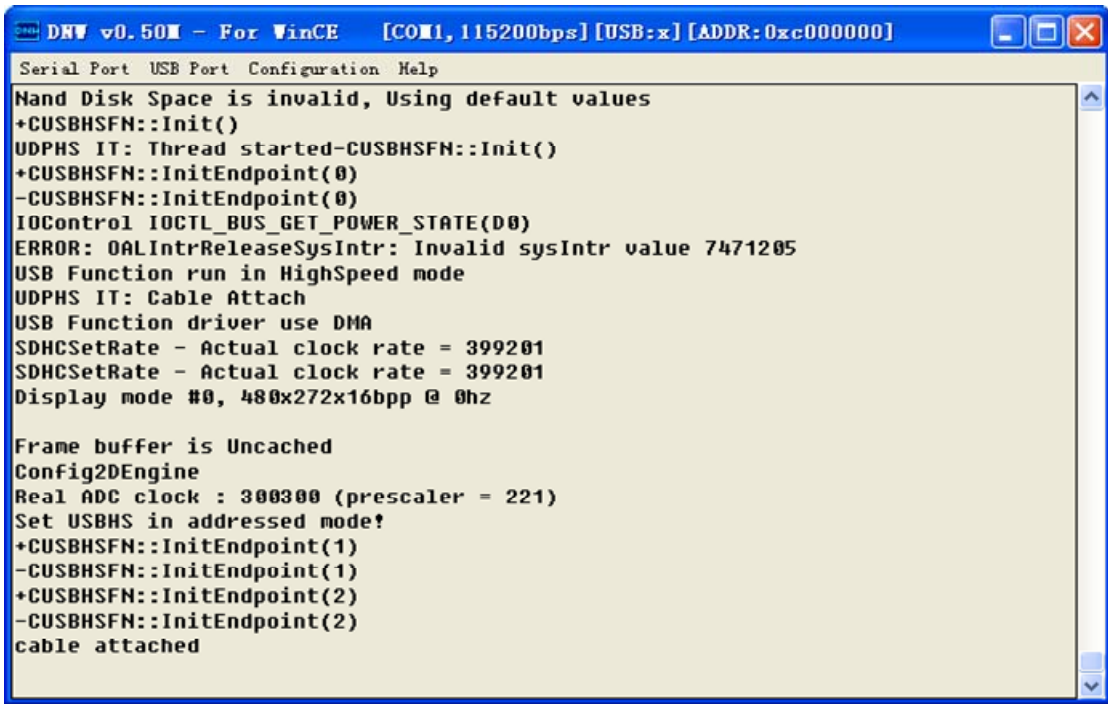


Figure 12.3.7

Chapter 13 Customization of WinCE system based on SBC6045 WinCE 6.0 BSP

Notes:
To develop Windows Embedded CE 6.0 operating system using SBC6045 BSP, you need setup Windows Embedded CE 6.0development workstation.
This Manual specifies that Windows Embedded CE 6.0 development workstation software is to be installed in Driver F, that is to say, the installation path for Windows Embedded CE 6.0 is [F:\WINCE600].

13.1 Installation of SBC6045 WinCE 6.0 BSP

Unzip SBC6045 CD \03 WinCE 6.0 Kit\01 BSP \SBC6045.rar to F:\WINCE600\PLATFORM of development workstation. Unzip SBC6045 CD \03 WinCE 6.0 Kit\01 BSP \ATMEL.rar to F:\WINCE600\PLATFORM\COMMON\SRC\SOC of development workstation, then the installation of SBC6045 WinCE 6.0 BSP is finished.

13.2 Modules of SBC6045 WinCE 6.0 BSP

SBC6045 WinCE 6.0BSP consists of two parts, i.e.: the two folders, SBC6045 and ATAMEL, the SBC6045 folder stores the board-level codes of SBC6045 and WinCE registry files and other WinCE configuration files. Here the code files is used to configure pin functions, configuration files are used to build WinCE system. The ATMEL folder stores AT91SAM9G45 chip-level codes. In general, clients don't have to modify the code under ATAMEL folder, they only need modify code and configuration

files under SBC6045 folder.

The following paragraphs will describe the folders and files under the SBC6045 folder. In general, the codes under the ATMEL folder are in no need to change, so the Manual doesn't provide details of these codes. If you need change them, please view the files and folders under the ATMEL folder by yourself.

The directory tree of SBC6045 folder and the definitions of the folders and files under it are shown as below:

```
├──CATALOG      This directory stores SBC6045.pbcxml, this file is used to view the modules in VS2005 Catalog Items View
├──SRC
│   ├──BOOTLOADER
│   │   ├──EBOOT          This directory stores public codes of EBOOT
│   │   ├──FirstBoot      This directory stores the first-level user booting code
│   │   ├──SplashScreen   code be interrelated to screen display
│   │   ├──SDCard         This directory store the code that WinCE system Eboot uses when booting from SD card
│   │   └──SPIDataFlash   This directory stores the codes that WinCE system EBOOT uses when booting from Dataflash
│   ├──DRIVERS
│   │   ├──Display        This directory stores pin configure files of SBC6045 TFT LCD driver
│   │   ├──GPIO           This directory stores SBC6045 AT91SAM9G45 chip-level IO driver code
│   │   ├──I2C            This directory stores driver code of SBC6045 AT9G45 chip I2c interface
│   │   ├──KeyPad         This directory stores driver code of pin keys of SBC6045 AT91SAM9G45 chip
│   │   ├──NandFlash      This directory stores NAND flash driver code
│   │   ├──EEPROM         This directory stores eeprom driver code
│   │   ├──SDHC           This directory stores SD card slot SDIO mode driver code of SBC6045 board
│   │   ├──Serial         his directory stores driver code of serial port outgoing from AT91SAM9G45 chip
│   │   ├──EMACB          This directory stores dirvers of AT91SAM9G45 embeded MAC
│   │   ├──EmacbNDIS      This directory stores net NDIS driver
│   │   ├──SPI            This directory stores driver code of SPI pin outgoing from AT91SAM9G45 chip
│   │   ├──RTC            This directory stores driver code of external RTC chip DS3231
│   │   ├──WAVEDEVWM9711  This directory stores driver code of WM9711
│   │   ├──WAVEDEVAD1981  This directory stores driver code of AD1981 Audio chip
│   │   ├──VideoDecoder   This directory stores driver code of video decoder
│   │   ├──TouchScreen    This directory stores driver code of touch screen
│   │   ├──USBHSFN        This directory stores driver code of USB device pin outgoing from AT91SAM9G45 chip
│   │   └──USB_Host       This directory stores driver code of USB Host pin outgoing from AT91SAM9G45 chip
│   ├──INC This directory stores the head files to be used in BSP
│   ├──KITL This directory stores the code related to KITL
│   ├──MISC
│   └──OAL
│       ├──OALEXE         generates the code related to WinCE 6.0 OAL.EXE
│       └──OALLIB         generates the code related to WinCE 6.0 OAL.EXE
└──FILES                  This directory stores configure files will used in customer system.
```

13.3 Compilation of WinCE system based on SBC6045 WinCE 6.0 BSP

Here we will not describe how to customize a WinCE project based a BSP in VS2005 WinCE 6.0 development environment, user can directly copy SBC6045 CD \03 WinCE 6.0 Kit\02 Project \SBC6045.rar file to the directory F:\WINCE600\OSDesigns\ of development workstation, and unzip this file under the same directory. User can directly open the project file SBC6045.sln [under F:\WINCE600\OSDesigns\SBC6045 folder], then you can select [Build-> Build Solution] in VS2005 to start compiling the customized WinCE system.

13.4 Compilation of WinCE system based on SBC6045 WinCE 6.0 BSP

This section will describe the steps on how to customize WinCE 6.0 in SBC6045 BSP:

1. Open Visual Studio 2005, click File->New->Project, see Figure 13.4.1 below:

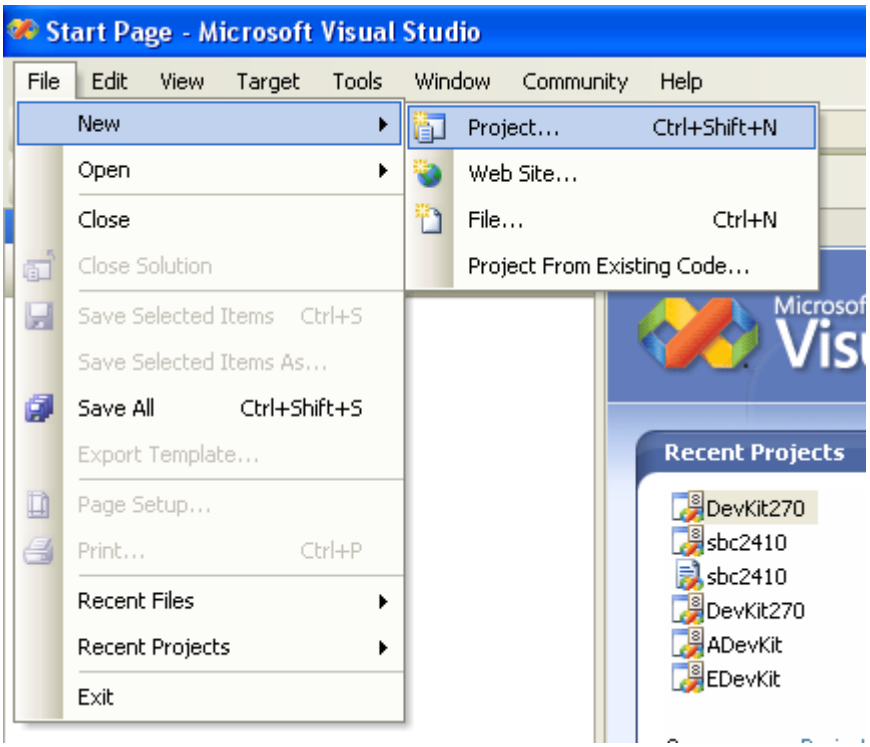


Figure 13.4.1

2. Select Platform Builder for CE 6.0 from Other project types in New Project wizard, enter SBC6045 in name:, see Figure 13.4.2:

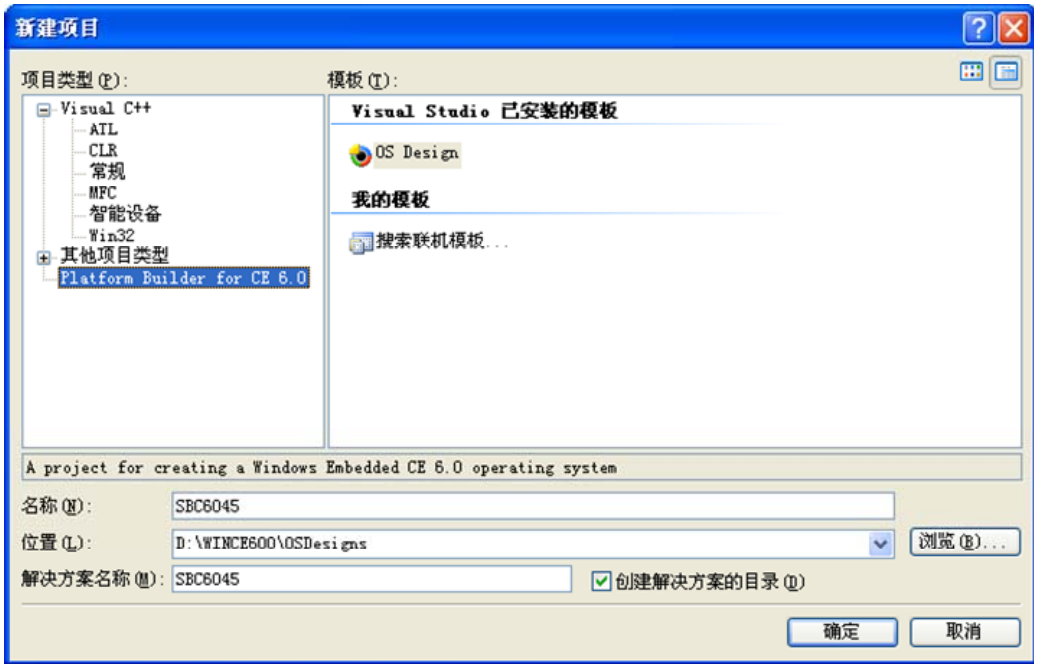


Figure 13.4.2

3. Click OK button as shown in Figure 13.4.2, the system will next step of Windows Embedded CE 6.0 OS Design Wizard, see Figure 13.4.3:

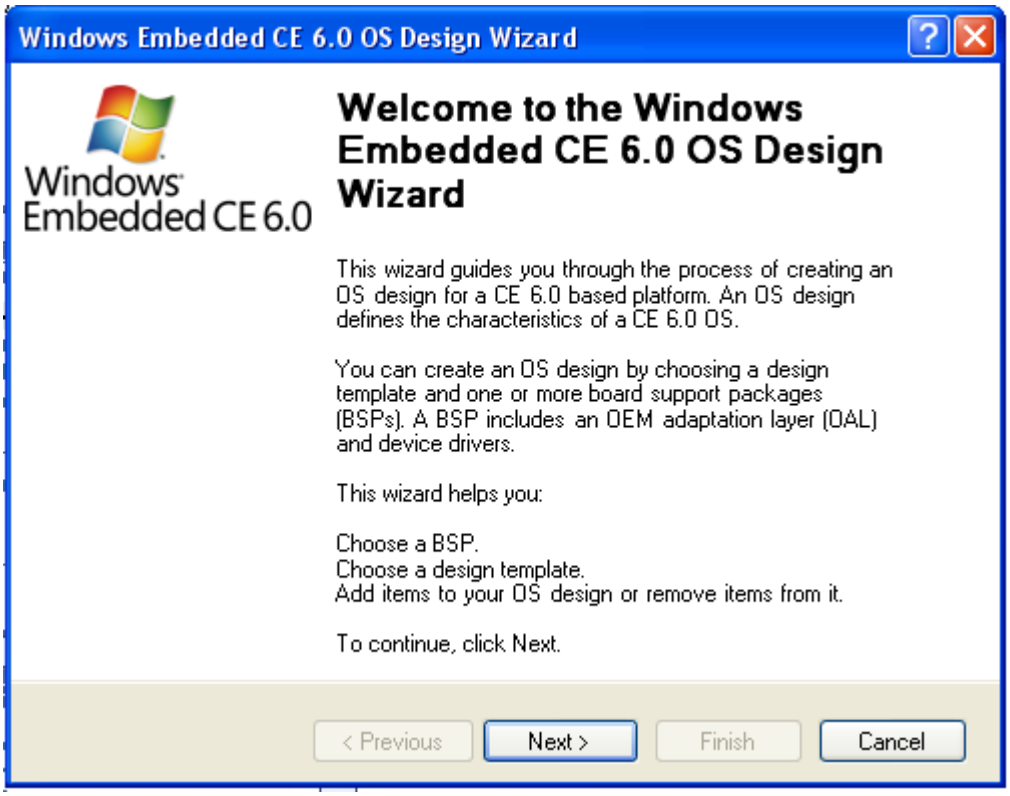

Windows Embedded CE 6.0 OS Design Wizard
Windows Embedded CE 6.0
Welcome to the Windows Embedded CE 6.0 OS Design Wizard
This wizard guides you through the process of creating an OS design for a CE 6.0 based platform. An OS design defines the characteristics of a CE 6.0 OS.
You can create an OS design by choosing a design template and one or more board support packages (BSPs). A BSP includes an OEM adaptation layer (OAL) and device drivers.
This wizard helps you:
Choose a BSP.
Choose a design template.
Add items to your OS design or remove items from it.
To continue, click Next.
< Previous
Next >
Finish
Cancel

Figure 13.4.3

4. Click Next button in Windows Embedded CE 6.0 OS Design Wizard as shown in Figure 13.4.3, select SBC6045:ARMV4I in Board Support Packages (BSPs) as shown in Figure 13.4.4:

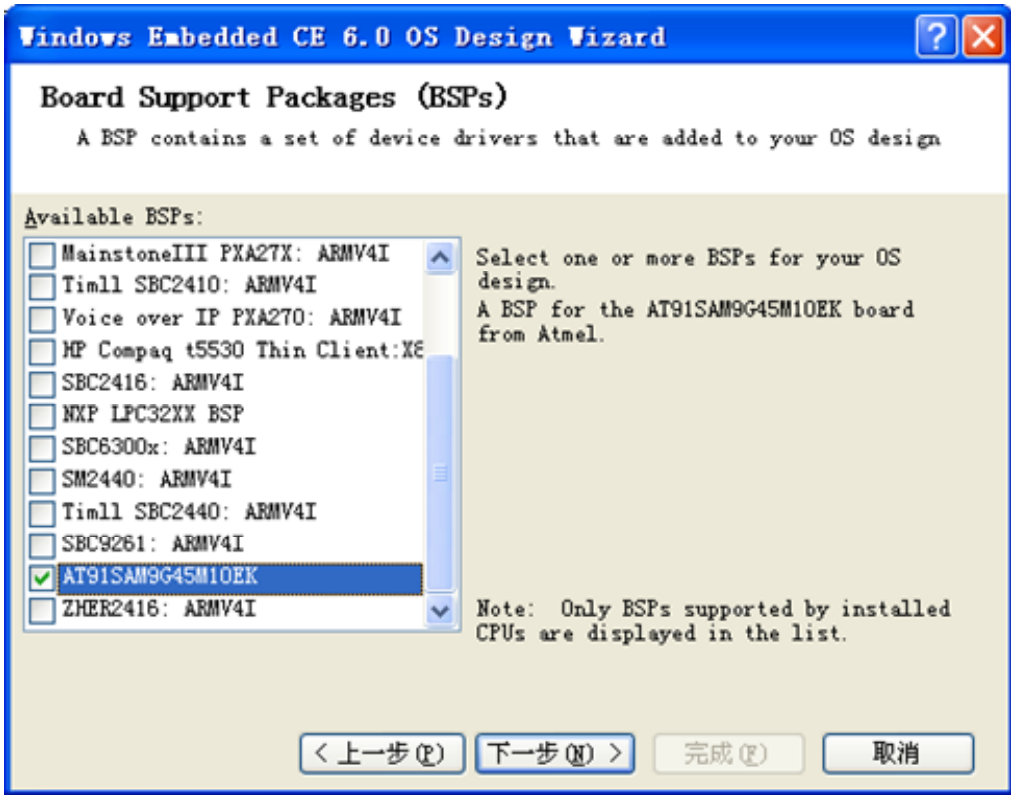

Windows Embedded CE 6.0 OS Design Wizard
Board Support Packages (BSPs)
A BSP contains a set of device drivers that are added to your OS design
Available BSPs:
MainstoneIII PXA27X: ARMV4I
Timll SBC2410: ARMV4I
Voice over IP PXA270: ARMV4I
HP Compaq t5530 Thin Client:X8
SBC2416: ARMV4I
NXP LPC32XX BSP
SBC6300x: ARMV4I
SM2440: ARMV4I
Timll SBC2440: ARMV4I
SBC9261: ARMV4I
AT91SAM9G45M10EK
ZHER2416: ARMV4I
Select one or more BSPs for your OS design.
A BSP for the AT91SAM9G45M10EK board from Atmel.
Note: Only BSPs supported by installed CPUs are displayed in the list.
< 上一步(P)
下一步(N) >
完成(F)
取消

Figure 13.4.4

5. Click Next button as shown in Figure 13.4.4, select PDA Device in newly opened Design Templates->Available design templates, see Figure 13.4.5:

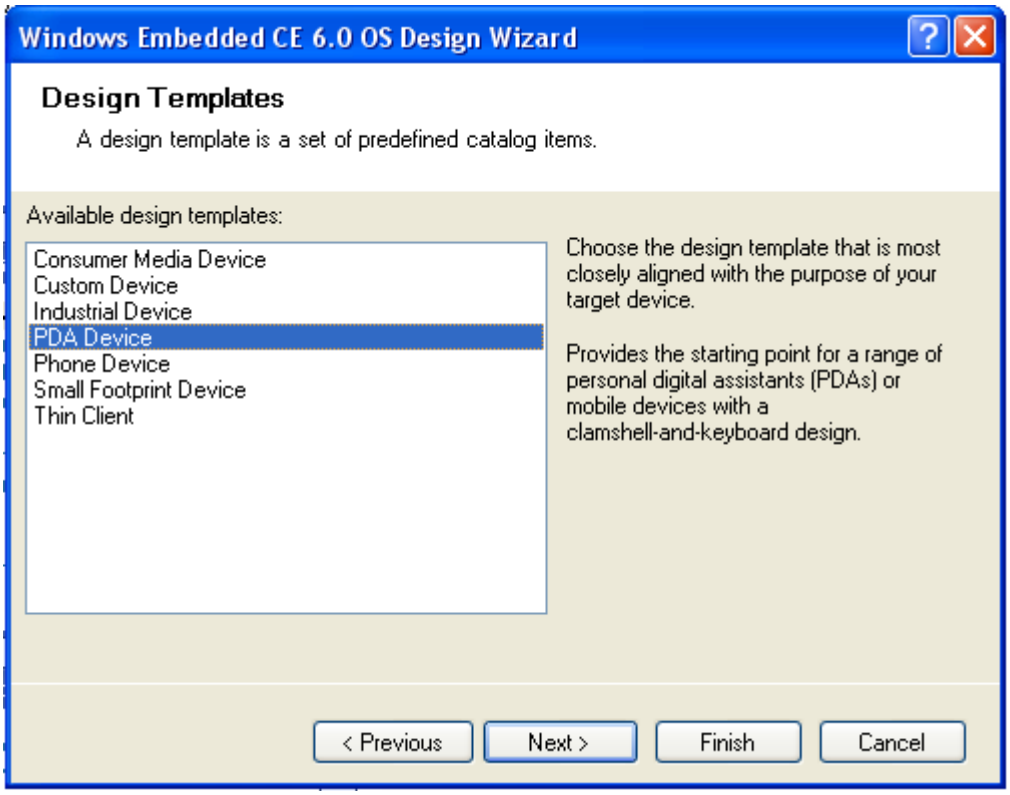

Windows Embedded CE 6.0 OS Design Wizard
Design Templates
A design template is a set of predefined catalog items.
Available design templates:
Consumer Media Device
Custom Device
Industrial Device
PDA Device
Phone Device
Small Footprint Device
Thin Client
Choose the design template that is most closely aligned with the purpose of your target device.
Provides the starting point for a range of personal digital assistants (PDAs) or mobile devices with a clamshell-and-keyboard design.
< Previous
Next >
Finish
Cancel

Figure 13.4.5

6. Click Next as shown in Figure 13.4.5, select Mobile Handled in newly opened Design Template

Variants->Variants, see Figure13.4.6:

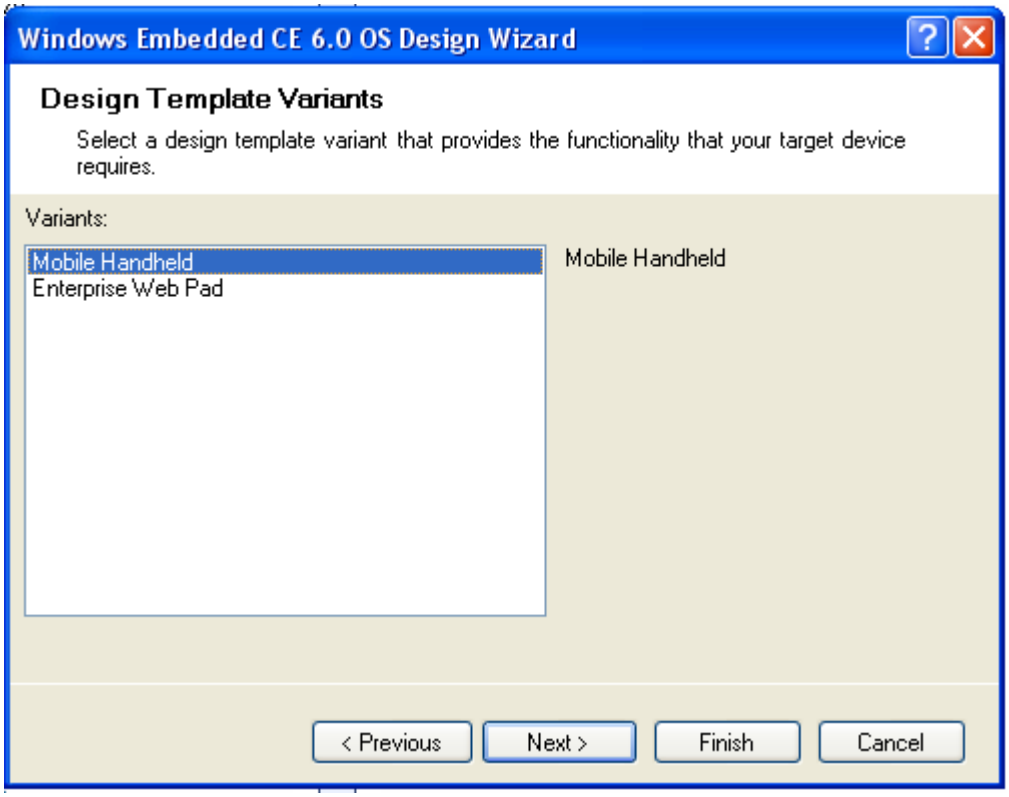


Figure 13.4.6

7. Click Next button as shown in Figure 13.4.6 to open Applications & Media window, add Internet Browser->Internet Explorer 6.0 and WordPad in existing default options, see Figure 13.4.7

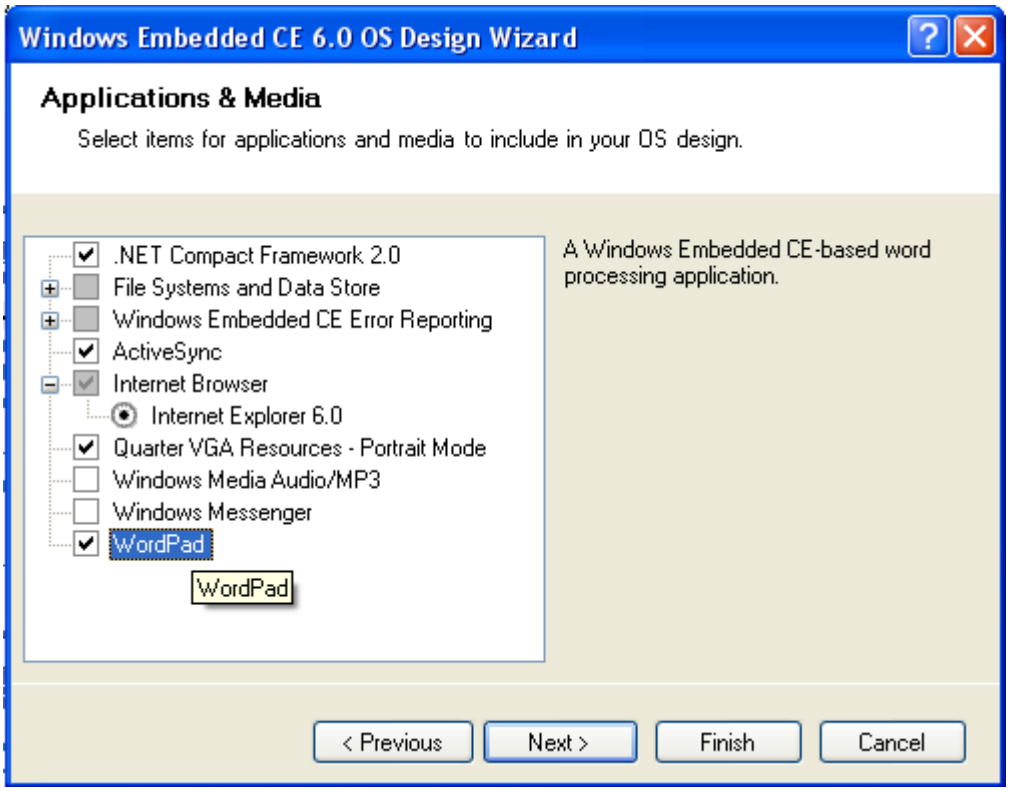


Figure 13.4.7

8. Click Next button as shown in Figure 13.4.7 to open Networking & Communications, remove

Personal Area Network(PAN)->Bluetooth and Personal Area Network(PAN)->IraDA from in existing default options, see Figure13.4.8:

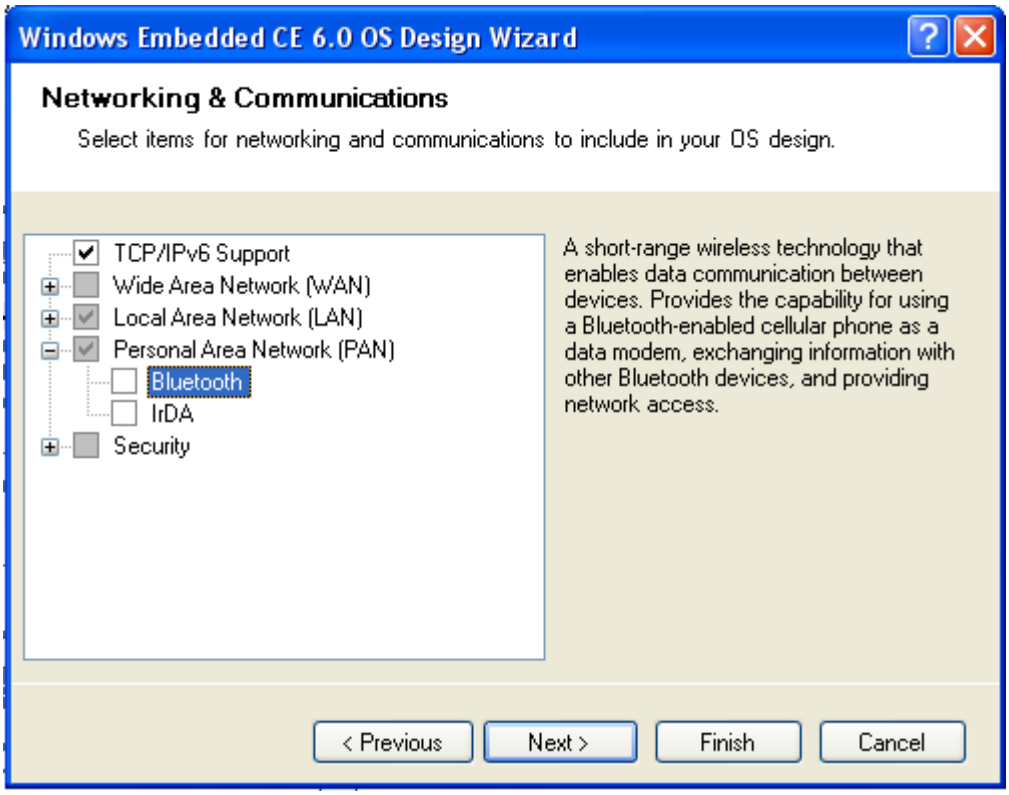

Windows Embedded CE 6.0 OS Design Wizard
Networking & Communications
Select items for networking and communications to include in your OS design.
TCP/IPv6 Support
Wide Area Network (WAN)
Local Area Network (LAN)
Personal Area Network (PAN)
Bluetooth
IrDA
Security
A short-range wireless technology that enables data communication between devices. Provides the capability for using a Bluetooth-enabled cellular phone as a data modem, exchanging information with other Bluetooth devices, and providing network access.
< Previous
Next >
Finish
Cancel

Figure 13.4.8

9. Click Next button as shown in Figure 13.4.8, Click finish in newly opened OS Design Project Wizard Complete, see Figure 13.4.9:

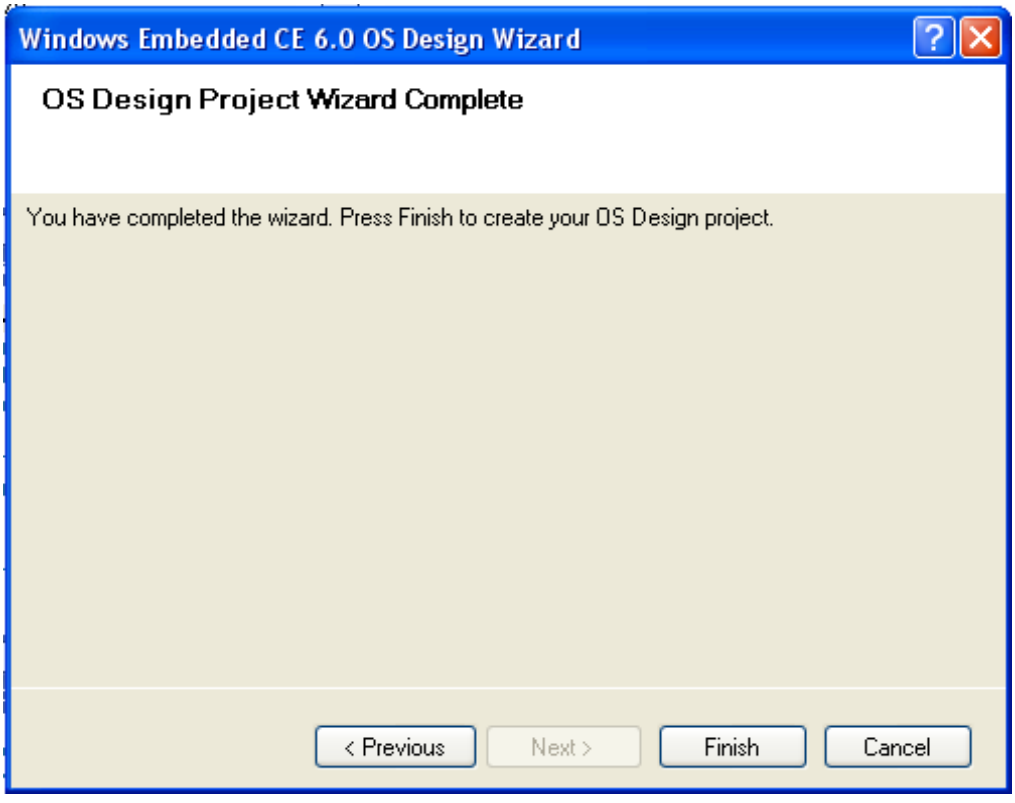

Windows Embedded CE 6.0 OS Design Wizard
OS Design Project Wizard Complete
You have completed the wizard. Press Finish to create your OS Design project.
< Previous
Next >
Finish
Cancel

Figure13.4.9

10. Click Acknowledge in the interface as shown in Figure 13.4.10 to finish the initial customization of WinCE 6.0 OS.

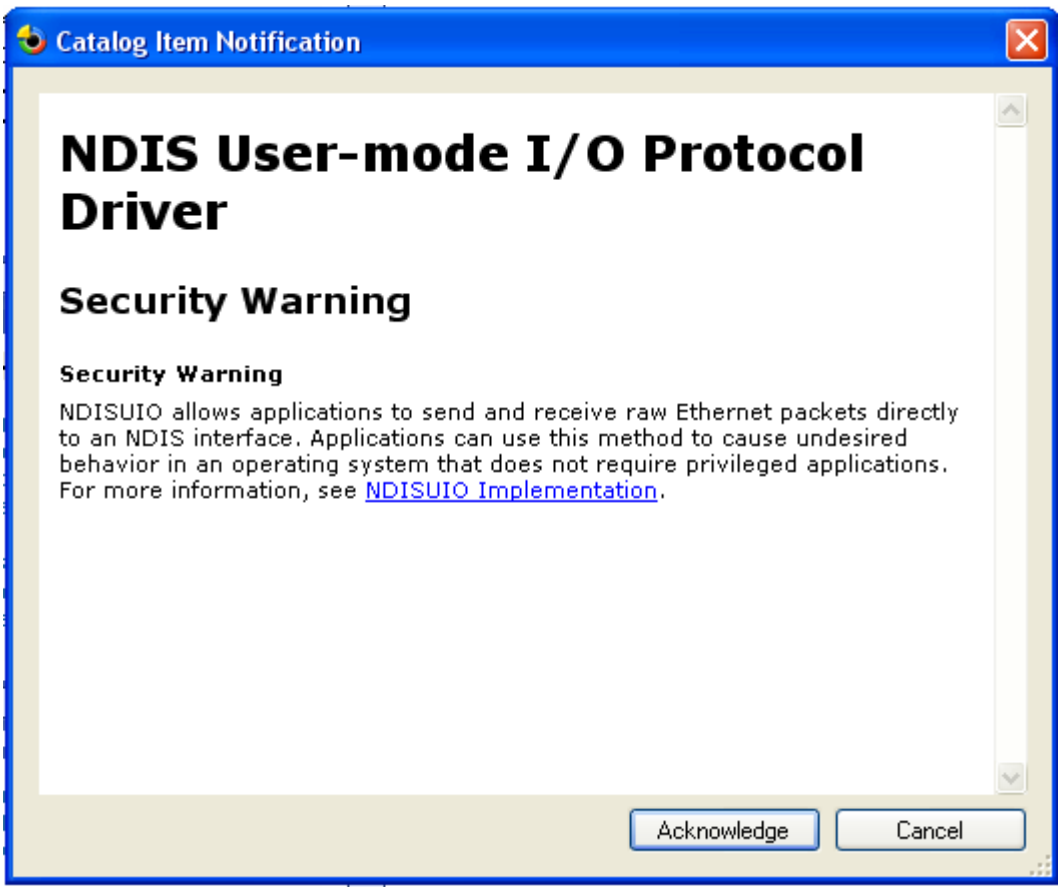

Catalog Item Notification
NDIS User-mode I/O Protocol Driver
Security Warning
Security Warning
NDISUIO allows applications to send and receive raw Ethernet packets directly to an NDIS interface. Applications can use this method to cause undesired behavior in an operating system that does not require privileged applications. For more information, see NDISUIO Implementation.
Acknowledge
Cancel

Figure13.4.10

11. Tick the following options under View->other windows->Catalog Items View->SBC6045->Core OS->CEBASE->Core OS Services->USB HOST Support in Catalog Items View of VS2005.

USB Function Driver USB Host Support USB Human Input Device (HID) Class Driver->USB HID Keyborad and Mouse USB Storage Class Driver

See as Figure 13.4.11

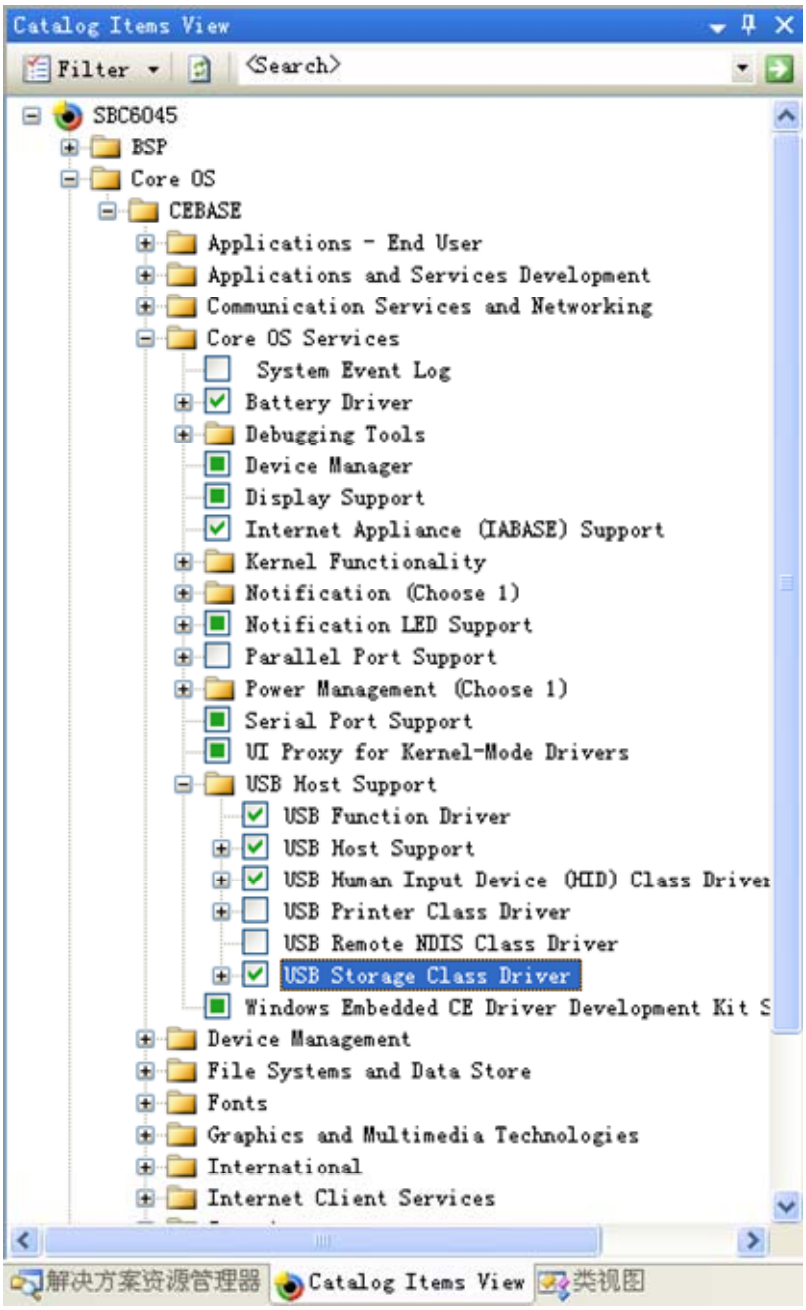


Figure 13.4.11

12. Add the following options following the steps of add USB relevant modules as described above:

Core OS->CEBASE ->Communication Services and Networking->Networking-General->Domain Discovery Core OS->CEBASE ->Communication Services and Networking->Networking-General ->Extended DNS Querying and Update(DNSAPI)

Here we remove the remove the existing default option below:

Core OS->CEBASE -> Communication Services and Networking->Networking-General-> TCP/IPv6 Support

Continue to add the following options:

Core OS->CEBASE->File Systems and Data Store->Storage Manager->Storage Manager Control Panel Applet

Core OS->CEBASE->International->Locale Specific Support-> Chinese （Simplified）->Fonts->SimSun&NsimSun(Choose 1)->SimSun&NsimSun

Core OS->CEBASE->International->Locale Specific Support-> Chinese （Simplified）->GB1803030 Data Converter-

Core OS->CEBASE->International->Locale Specific Support-> Chinese （Simplified）-> Monotype Imaging AC3 Font Compression

Device Drivers->SDIO->SDIO Host->SDIO Standard Host Controller

Device Drivers->SDIO->SDIO Memory->SD Memory

Device Drivers->USB Function->USB Function Clients->Mass Storage

Device Drivers->USB Function->USB Function Clients->serial

13. Set compilation type as AT91SAM9G45M10EK Release, see Figure 13.4.12:

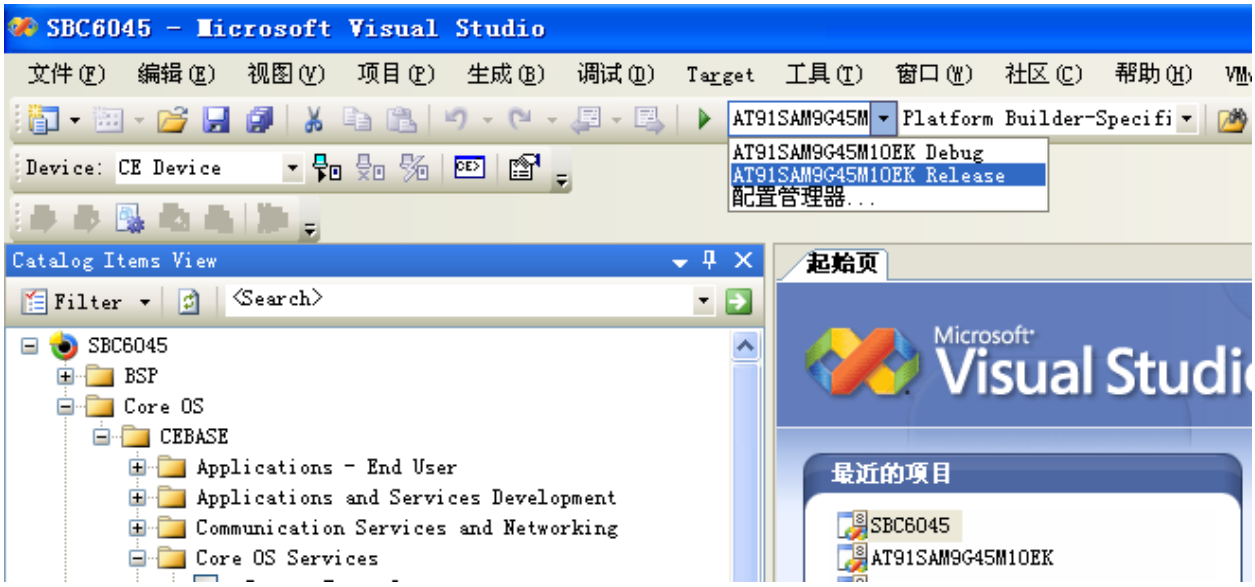


Figure 13.4.12

14. Click Project->properties in VS2005 , see Figure 13.4.13:

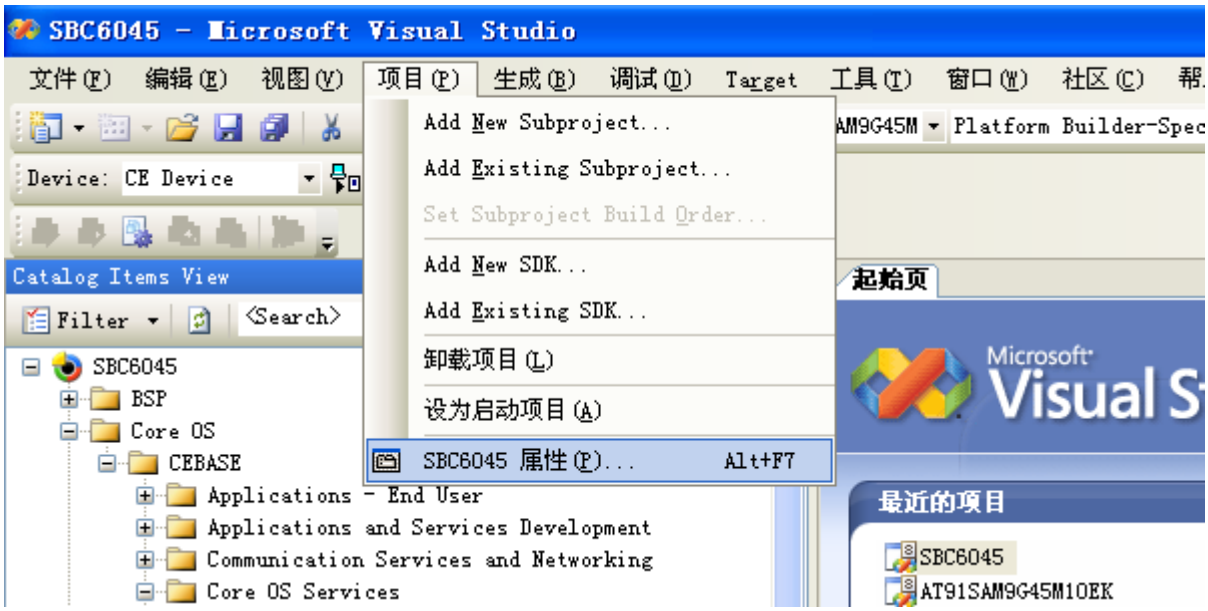


Figure 13.4.13

15. Tick Enable eboot space in memory(IMAGE=1) in Build Options, as shown in Figure 13.4.15, click OK to finish the settings of compilation.

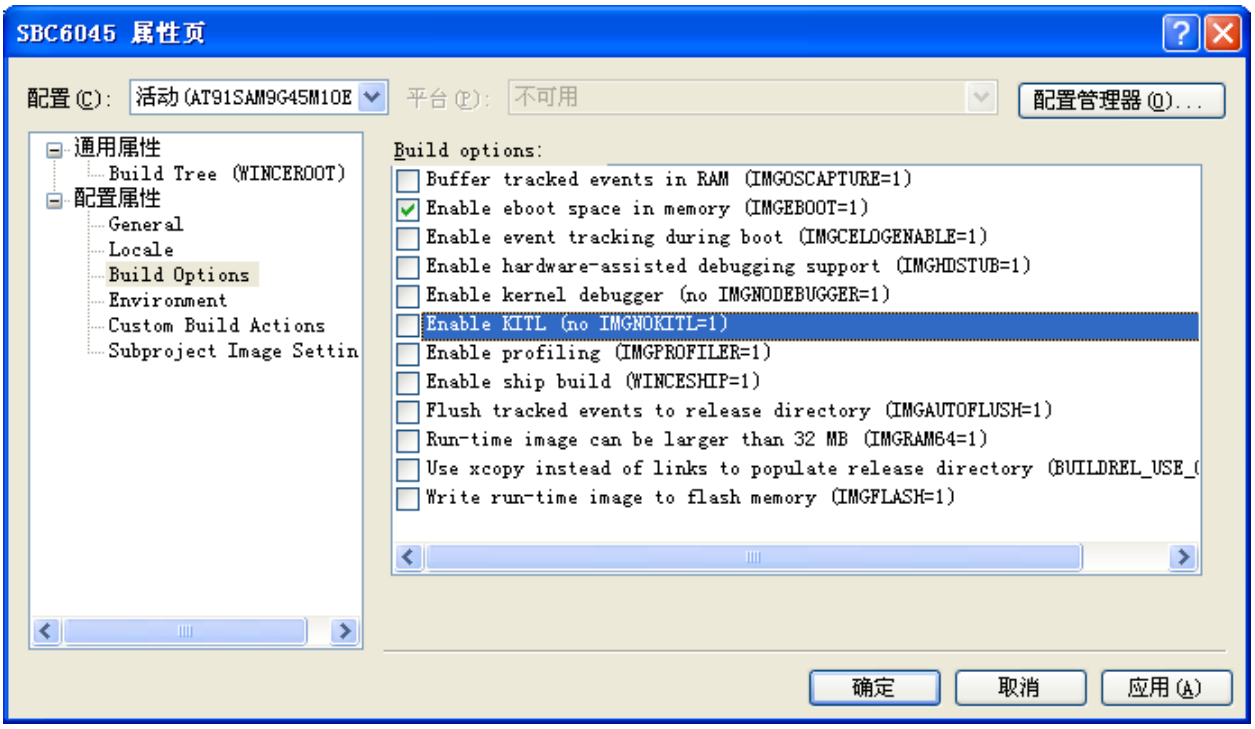


Figure13.4.15

16. As shown in Figure 13.4.16, tick the driver of the module you need SBC6045 board, in View->Other window->Catalog Items View->SBC6045->Third Party-> AT91SAM9G45M10EK in VS2005. (For details of each driver module please refer to Section 6.5) .

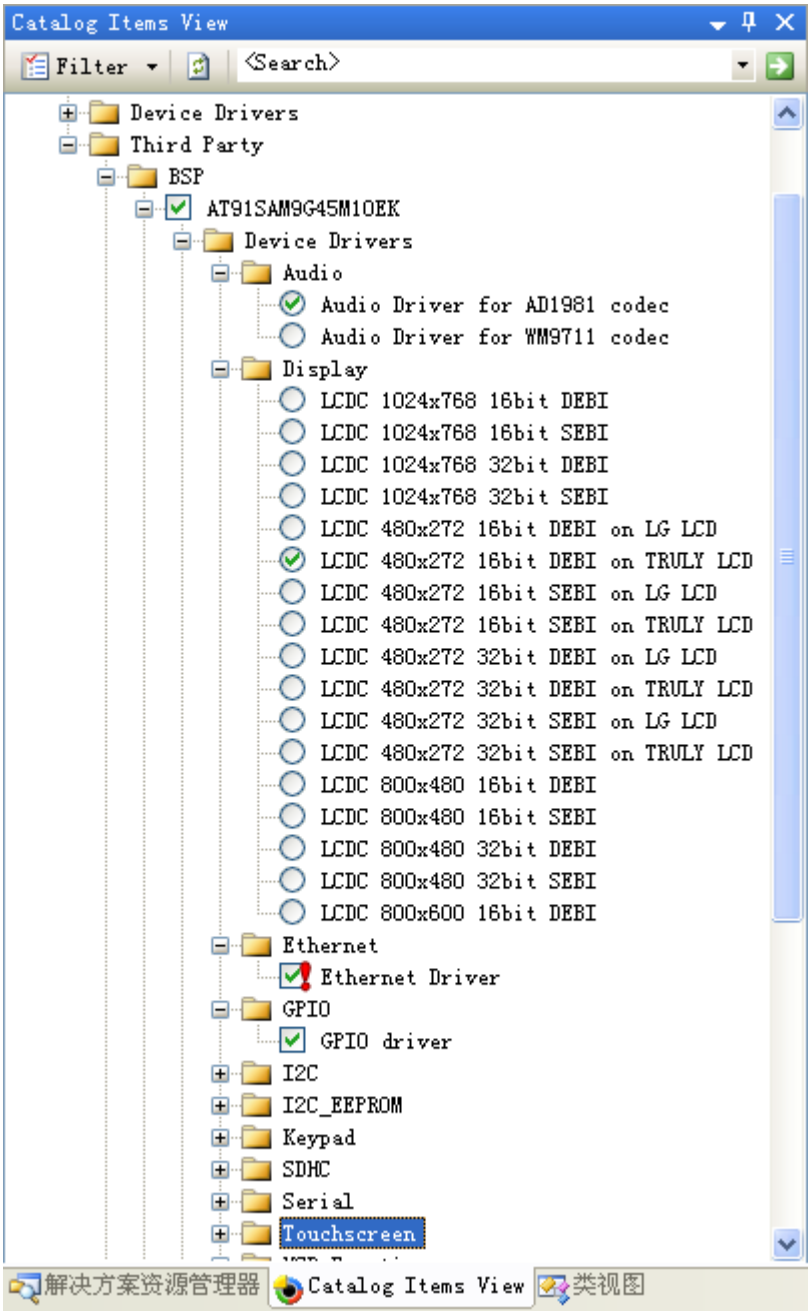


Figure 13.4.16

17. As shown in Figure 13.4.17, click Build->Advanced Build Commands->Sysgen of VS2005 to start compiling:

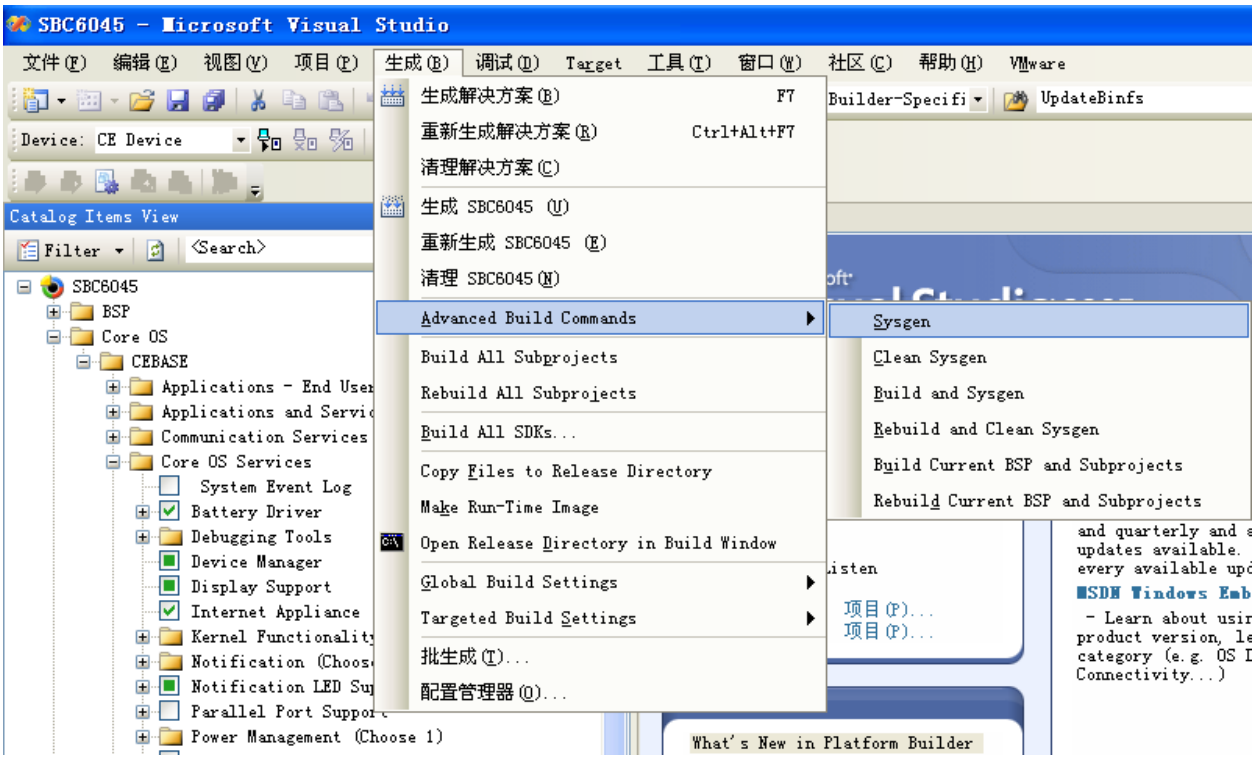


Figure13.4.17

18. As the compilation may take a long time (depends on the hardware configurations of development workstation), please wait. After the system compilation is successful, VS2005 will export the following information as shown in Figure 13.4.18:

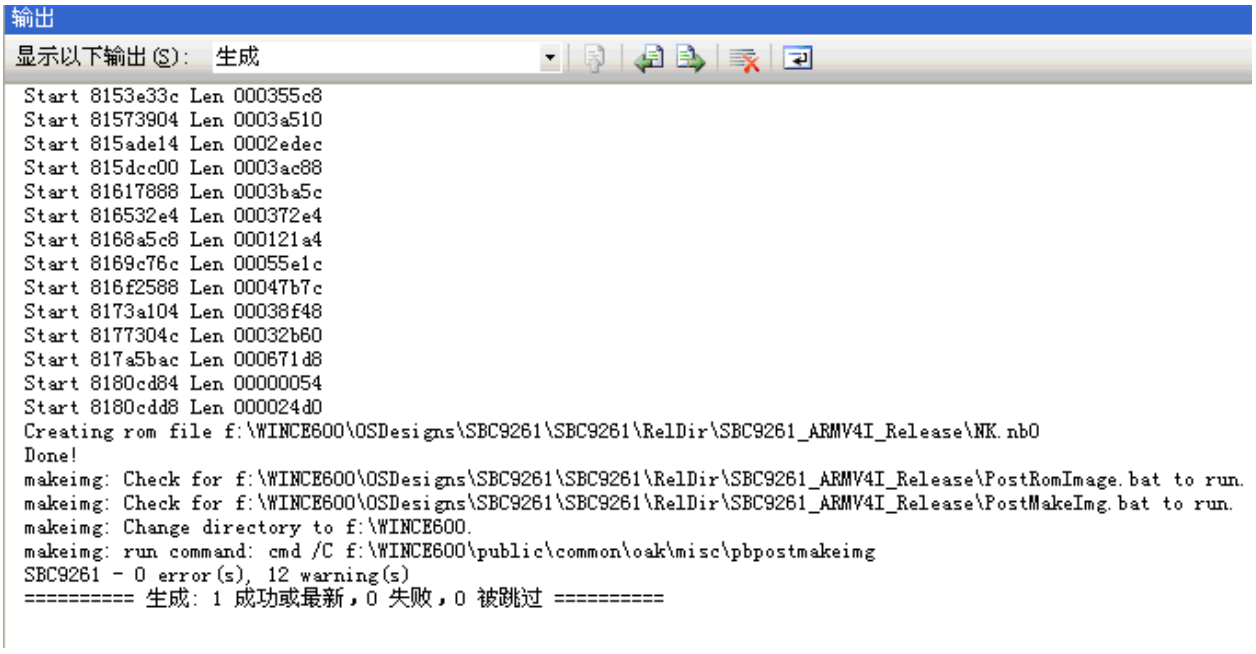
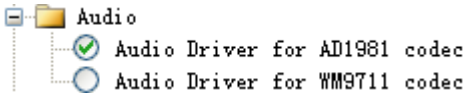
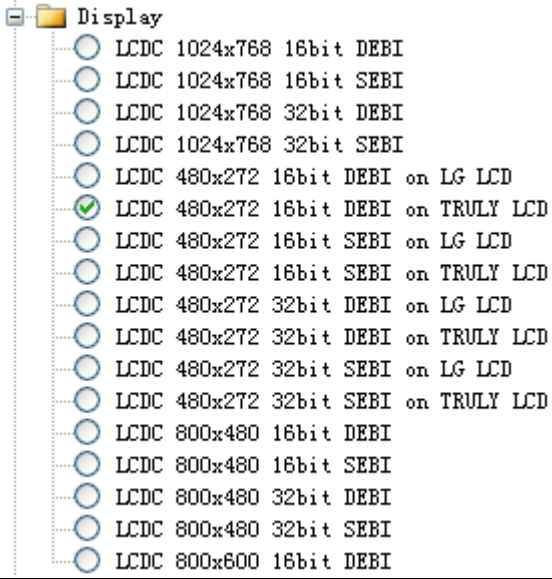
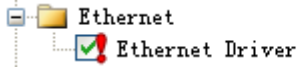
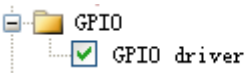

输出
显示以下输出(S): 生成
Start 8153e33c Len 000355c8
Start 81573904 Len 0003a510
Start 815ade14 Len 0002edec
Start 815dcc00 Len 0003ac88
Start 81617888 Len 0003ba5c
Start 816532e4 Len 000372e4
Start 8168a5c8 Len 000121a4
Start 8169c76c Len 00055e1c
Start 816f2588 Len 00047b7c
Start 8173a104 Len 00038f48
Start 8177304c Len 00032b60
Start 817a5bac Len 000671d8
Start 8180cd84 Len 00000054
Start 8180cdd8 Len 000024d0
Creating rom file f:\WINCE600\OSDesigns\SBC9261\SBC9261\RelDir\SBC9261_ARMV4I_Release\NK.nb0
Done!
makeimg: Check for f:\WINCE600\OSDesigns\SBC9261\SBC9261\RelDir\SBC9261_ARMV4I_Release\PostRomImage.bat to run.
makeimg: Check for f:\WINCE600\OSDesigns\SBC9261\SBC9261\RelDir\SBC9261_ARMV4I_Release\PostMakeImg.bat to run.
makeimg: Change directory to f:\WINCE600.
makeimg: run command: cmd /C f:\WINCE600\public\common\oak\misc\pbpostmakeimg
SBC9261 - 0 error(s), 12 warning(s)
========== 生成: 1 成功或最新，0 失败，0 被跳过 ==========

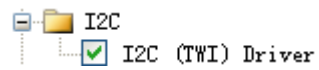
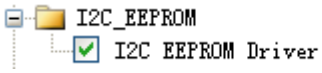
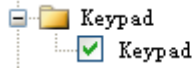
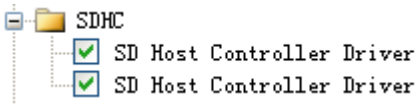
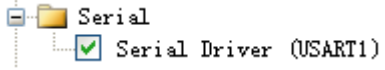
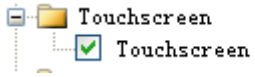
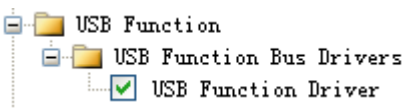
Figure 13.4.18

19. The moment WinCE 6.0 image files, i.e.: STEPLDR.nb0, EBOOT.nb0, NK.nb0, STEPLDR.bin, EBOOT.bin, NK.bin, will be generated under F:\WINCE600\OSDesigns\SBC6045\ RelDir\ AT91SAM9G45M10EK Release folder.

13.5 Modules of SBC6045 WinCE 6.0 BSP driver

After SBC6045 WinCE 6.0 BSP is installed and the project based on the BSP is initially customized following the instructions of Section 6.4, click View->Other window->Catalog Items View->SBC6045->Third Party-> AT91SAM9G45M10EK Release in VS2005, you will see the modules of each driver module of SBC6045 WinCE 6.0 BSP, you can choose them on your demand. The table below will describe the functions of each module in details.

Module	Functions	Remarks
	Audio Driver module	If you need use the play function of external audio chip AD1981 chip on SBC6045 board, directly tick this module in system customization.
	The driver of TFTLCD on SBC6045	TFT LCD support should add this module in system .And customer should select the correspond type of LCD the system have.
	AT91SAM9G45 Ehernet driver	If you need use Ethernet. directly tick this module in system customization.
	AT91SAM9G45 Gerneral IO driver	If you need this function. directly tick this module in system customization.

	The driver of I2C interface on SBC6045 board.	If you need this function. directly tick this module in system customization.
	External Eeprom driver of SBC6045	If you need use EEPROM in systerm. directly tick this module and I2C interface driver in system customization.
	The driver of IO key interface on SBC6045 board outgoing from AT91SAM9G45	If you need this function. directly tick this module in system customization.
	AT91SAM9G45 SD card controller driver	If you need SD function. directly tick this module in system customization.
	Driver of USART1 serial port on SBC6045 outgoing from AT91SAM9G45 chip	If you need use USART1 on SBC6045. directly tick this module in system customization.
	SBC6045 touch screen driver	Touch screen function support directly tick this module in system customization.
	USB Device driver on SBC6045	SBC6045 USB Device support . directly tick this module in system customization.

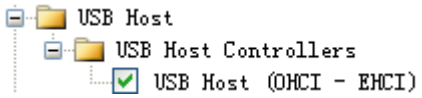
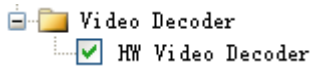
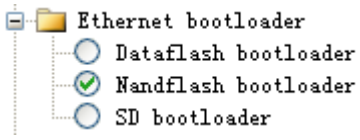
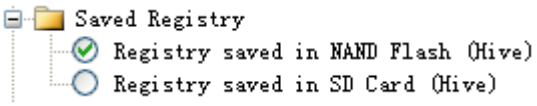
	USB Host driver on SBC6045	SBC6045 USB Host support, directly tick this module in system customization.
	AT91SAM9G45 On chip hardware video decoder	Need hardware video decoder function directly tick this module in system customization.
	SBC6045 boot mode select	Boot mode select
	Hive Registry	If you select Hive Registry, this module should be added when you customize the system.
	NAND flash driver	To use the rest NAND flash partition as storage after storing WinCE system, add this module when customizing the system.

Figure 13.5.1

13.6 How to enter EBOOT menu

1. Connect Debug serial port J23 of SBC6045 main board to serial port of development workstation using the serial port cable supplied with SBC6045 main board, open CD\ 03 WinCE 6.0 Kit\04 Tools\dnw.exe see Figure 13.6.1.

Figure 13.6.1

2. Click DNW Configuration->Options, select baudrate as 115200 (see Figure 13.6.2):

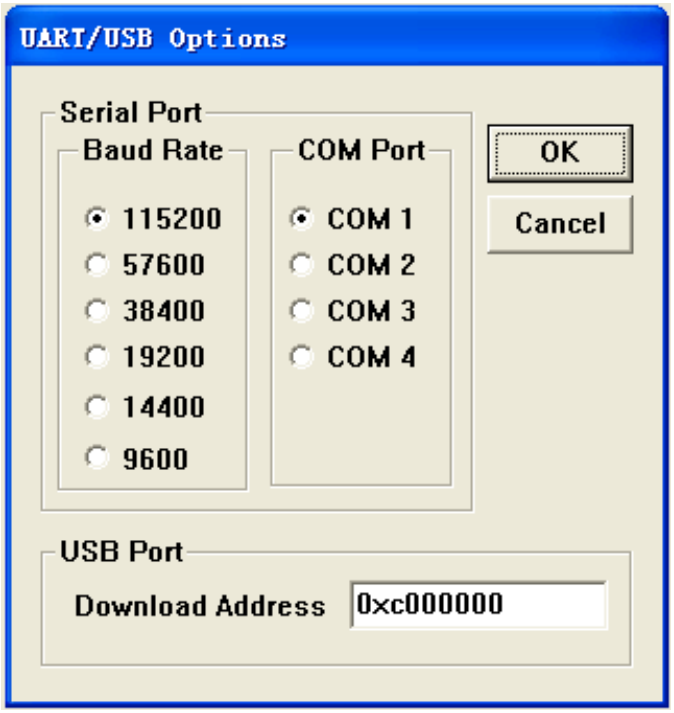


Figure13.6.2

3. Open serial port of development workstation (As shown in Figure 13.6.3, click DNW Serial Port-> Connect).

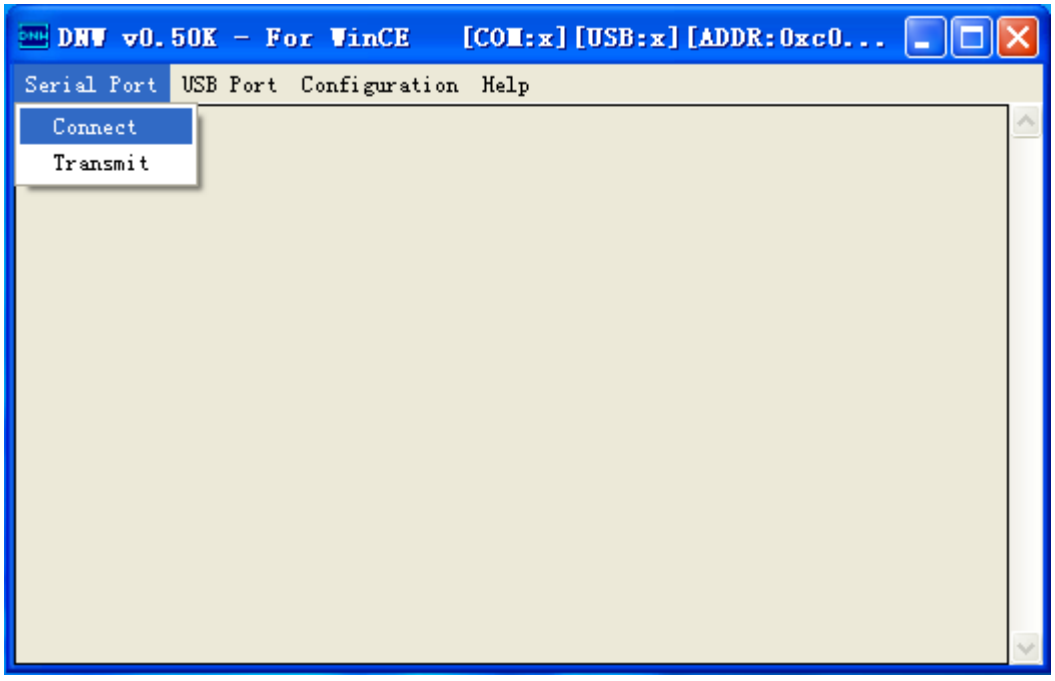


Figure13.6.3

4. Power on SBC6045 main board, SBC6045 serial port print information display enter countdown stage (the default countdown time is 5S after power-on of SBC6045 main board). Press SPACE key on DNW interface of development workstation, the moment SBC6045 EBOOT serial port output information as shown in Figure13.6.4 will appear:

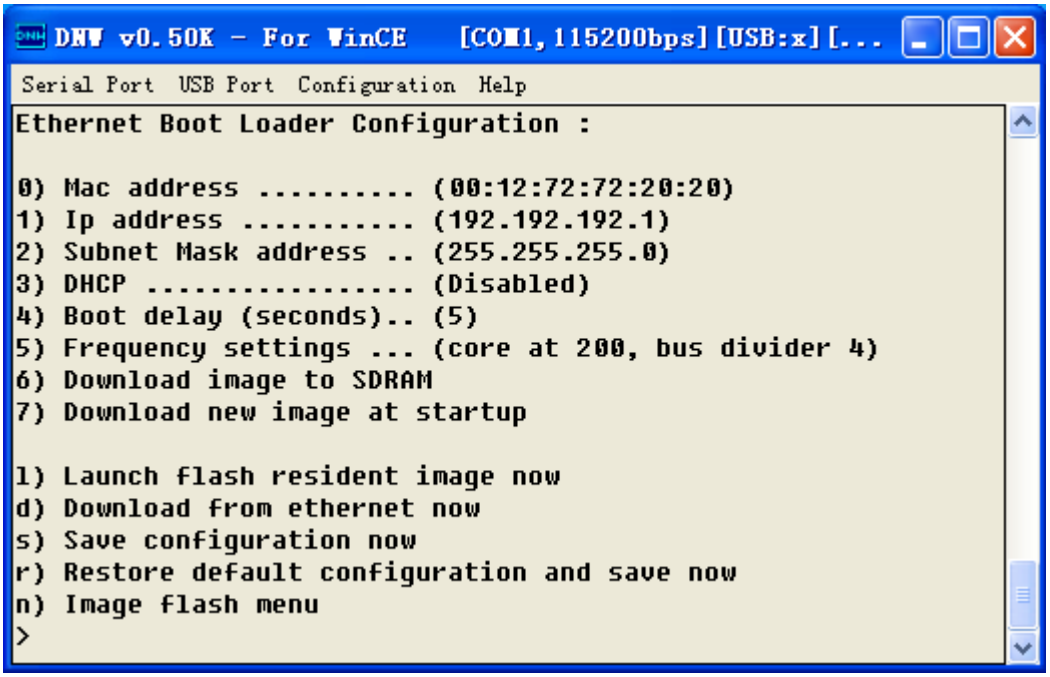

DNW v0.50K - For WinCE [COM1,115200bps][USB:x][...
Serial Port USB Port Configuration Help
Ethernet Boot Loader Configuration :
0) Mac address ..... (00:12:72:72:20:20)
1) Ip address ..... (192.192.192.1)
2) Subnet Mask address .. (255.255.255.0)
3) DHCP ..... (Disabled)
4) Boot delay (seconds).. (5)
5) Frequency settings ... (core at 200, bus divider 4)
6) Download image to SDRAM
7) Download new image at startup
l) Launch flash resident image now
d) Download from ethernet now
s) Save configuration now
r) Restore default configuration and save now
n) Image flash menu
>

Figure 13.6.5

13.7 EBOOT menu commands

Table13.7.1 EBOOTmenu commands

Command	Items	Functions
0	Mac address ..... (00:12:72:72:20:20)	To set SBC6045 MAC Address
1	Ip address ..... (192.192.192.1)	Set SBC6045 IP address
2	Subnet Mask address .. (255.255.255.0)	Setting SBC6045 subnet mask.
3	DHCP ..... (Disabled)	To set whether to dynamically allocate IP address for SBC6045
	DHCP ..... (Enabled)	
4	Boot delay (seconds).. (5)	To set the delay for EBOOT to launch NK
5	Frequency settings ... (core at 200, bus divider 2)	To set master frequency and bus frequency of AT91SAM9G45 chip
6	Download image to Flash	Download NK to SDRAM or NAND flash
	Download image to SDRAM	
7	Launch existing flash resident image at startup	EBOOT loads existing flash resident image or downloads NK again at startup
	Download new image at startup	
l	Launch flash resident image now	Load NK

d		Download from ethernet now	Download NK over Ethernet
s		Save configuration now	Save current EBOOT settings in flash partition
r		Restore default configuration and save now	Resume default configurations of EBOOT.
n	1	Erase all sectors	Erase all sectors of NAND flash
	2	Enter manually the image parameters	Manually enter booting parameters
	3	Quit...	Exit n sub-menu

1. Mac address ..... (00:12:72:72:20:20) （command 0）

Function： set SBC6045 net card MAC address

Operating instructions: Enter 0 in EBOOT menu in DNW interface, the following information will appear:

```
Enter new Mac Address:
```

Enter MAC address of SBC6045 main board net card in DNW interface and press ENTER key, here we set it as 00:11:22:33:44:55:

```
Enter new Mac Address: 00:11:22:33:44:55
```

2. Ip address ..... (192.192.192.1) （command1）

Functions: set SBC6045 main board net card IP address in EBOOT menu in DNW interface, the following information

Operating instructions: Enter 1 in EBOOT menu in DNW interface, the following information will appear:

```
Enter new IP address:
```

Enter IP address of SBC6045 main board net card in DNW interface and press ENTER key, here we set it as 192.192.192.1:

```
Enter new IP address: 192.192.192.1
```

3. Subnet Mask address .. (255.255.255.0) （Command 2）

Functions: set SBC6045 net card subnet mask

Operating instructions: Enter 2 in EBOOT menu in DNW interface, the following prompt information will appear:

```
Enter new subnet mask:
```

Enter subnet mask address of SBC6045 net card in DNW interface and press ENTER key, here we set it as 255.255.255.0:

```
Enter new subnet mask: 255.255.255.0
```

4. DHCP ..... (Disabled) （command3）

Functions: whether to allocate dynamic IP for SBC6045. if this function is enabled, the IP address of SBC6045 will be allocated by the online DHCP server of SBC6045; if this function is disabled. The IP address of SBC6045's IP is the IP address that set by command 1.

Operating instructions: enter 3 in EBOOT menu, the 3rd item will shift between

3) DHCP ..... (Enabled)

and

3) DHCP ..... (Disabled)

they mean Enable or Disable DHCP function respectively.

5. Boot delay (seconds).. (5) （command 4）

Functions: set the time delay of SBC6045 in system auto booting, if EBOOT waits for a time longer than that time, the system will be automatically booted. If you press SPACE in EBOOT menu in DNW interface within the set delay, EBOOT will enter EBOOT menu.

Operating instructions: Enter 4 in EBOOT menu in DNW interface, then enter preset time T (0<T<256), and press Enter key, the modifications of configurations must be saved by executing **,** and will not work unless you have restarted the system.

Notes: the preset time shall not be 0, otherwise the system will automatically enter Windows CE system after restarting, in this case, user can! ¯t enter E OOT menu by pressing space key.

6. Frequency settings ... (core at 200, bus divider 2) （command 5）

Functions: set master frequency and bus frequency of SBC6045 CPU AT91SAM9G45

Operating instructions: Enter 5 , DNW in EBOOT menu in DNW interface, the following information will appear:

Enter new Core Frequency (old frequency is 200 MHz)

Enter master frequency of CPU in DNW, here we set it as 200MHz, enter 200 in DNW, then enter ENTER

Enter new Core Frequency (old frequency is 200 MHz) 200

The moment the following information will appear in DNW:

Enter new Bus divider (old divider is 2)

Enter 2 in DNW, it means bus divides CPU frequency into two sub-frequency, that is to say, busfrequency is 100MHz, enter 2 in DNW and press ENTER

Enter new Bus divider (old divider is 2) 2

7. Download image to Flash （command 6）

Functions: command 6 decides whether the NK.bin file that EBOOT downloads from development workstation will finally be burnt into NAND flash.

Operating instructions: enter 6 in EBOOT menu, the 6 th item will shift between

6) Download image to SDRAM

and

6) Download image to Flash

If it shifts to “Download image to Flash”, the NK.bin file that EBOOT downloads from development workstation will finally be burnt into NAND flash, and will launch SDRAM and run the system; if it shifts to “Download image to SDRAM”, the NK.bin file that EBOOT downloads from development workstation will not be burnt into NAND flash, directly launch it in SDRAM and

run the system.

8. Launch existing flash resident image at startup （command 7）

Functions: Command 7 decides whether EBOOT directly launch NK of NAND flash or download it and burn NK again at startup.

Operating instructions: enter 7 in EBOOT menu, the 7th item will shift between

```
7) Launch existing flash resident image at startup
```

and

```
7) Download new image at startup
```

If it shifts to "Download new image at startup", EBOOT need download and burn NK again at startup. If it shifts to"Launch existing flash resident image at startup", EBOOT will directly launch NK from NAND flash.

9. Launch flash resident image now （command l）

Functions: Directly launch NK from NAND flash

Operating instructions: Enter l in EBOOT menu, EBOOT will start to launch NK from NAND flash.

10. Download from ethernet now（command d）

Functions: Directly download NK from Ethernet.

Operating instructions: Enter d in EBOOT menu, EBOOT will start to download NK from Ethernet.

11. Save configuration now（command s）

Functions: save current EBOOT configurations in Dataflash or NAND flash.

Operating instructions: Enter s in EBOOT menu, EBOOT will start to save currentconfigurations of EBOOT.

12. Restore default configuration and save now（command r）

Functions: resume default configurations of EBOOT.

Operating instructions: Enter r in EBOOT menu, EBOOT will start to resume default configurations of EBOOT.

13. Image flash menu (command n)

Functions: a NAND flash operating command. Enter n in EBOOT menu, the moment the following information, namely the sub-menu image flash menu will appear in DNW.

```
Image Flash Menu :
1) Erase all sectors
2) Enter manually the image parameters
3) Quit...
```

- 1) Erase all sectors erase the whole NAND flash。
- 2) Enter manually the image parameters enter relevant information of NK image.
- 3) Quit... exit tehe sub-menu Image flash menu.

Operating instructions: Enter n in EBOOT menu, the moment EBOOT will export the sub-menu image flash menu. Enter 1 in the sub-menu image flash menu, the system will erase all sectors of NAND flash; enter 2 in the sub-menu image flash menu, the moment the following information will appear in DNW

```
Enter the information found in the build report of the 'Make Image'. [entering 0 keeps present value]
Physical Start Address : (0x80059000) : 0x
```

Here we enter the default value 80059000 and press ENTER, the moment the following information will appear in DNW:

```
Enter the information found in the build report of the 'Make Image'. [entering 0 keeps present value]
Physical Start Address : (0x80059000) : 0x80059000
Starting ip : (0x8005a000) : 0x
```

We enter the default value 8005a000,the moment the following information will appear in DNW:

```
Enter the information found in the build report of the 'Make Image'. [entering 0 keeps present value]
Physical Start Address : (0x80059000) : 0x80059000
Starting ip : (0x8005a000) : 0x8005a000
Total ROM size : (0x2800000) : 0x
```

Then we enter default value 0x2800000 and press ENTER, the system will return to the sub-menu image flash menu. Enter 3 in the sub-menu image flash menu to exit the sub-menu image flash menu.

Notes: Physical Start Address, Physical Start Address, Total ROM size, the three items related to NK image files that we entered are the default information that EBOOT provides, they are very important when EBOOT launch system, if they are incorrect, the system will not be launched normally. User can
also execute the following steps to view the three parameters of NK.

1. *After the compilation of SBC6045 project based on SBC6045 WinCE 6.0 is successful, click*
   ->Open Release Directory in Build Window in VS2005. See Figure 13.7.1

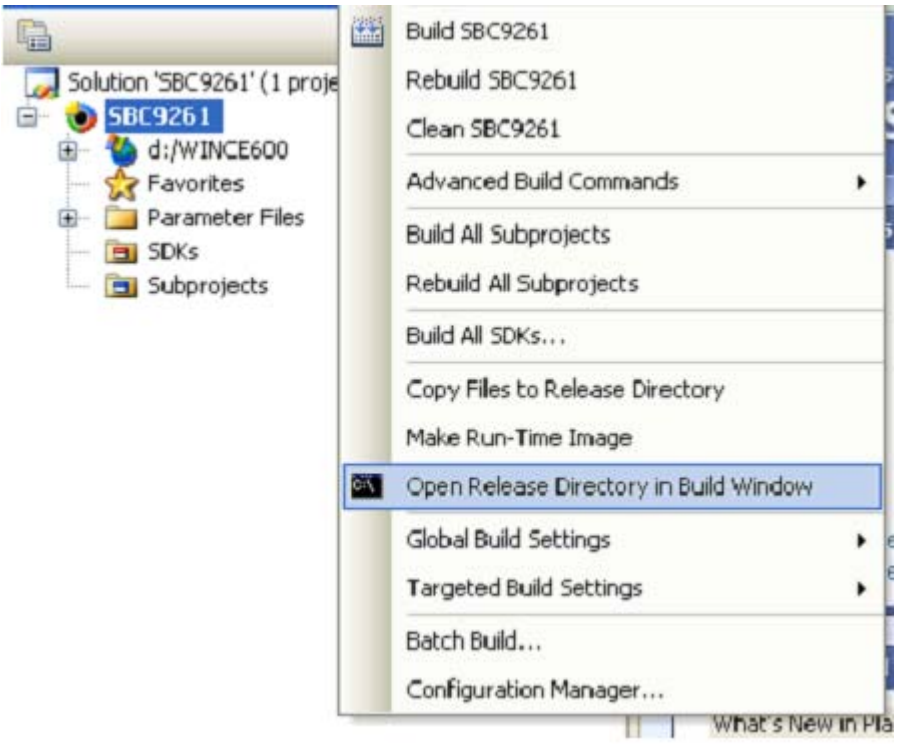


Figure13.7.1

2. *Enter viewbin nk.bin in the opened SBC6045_ ARMV4I Release command window as shown in Figure 5.6, relevant information of NK will be displayed.*

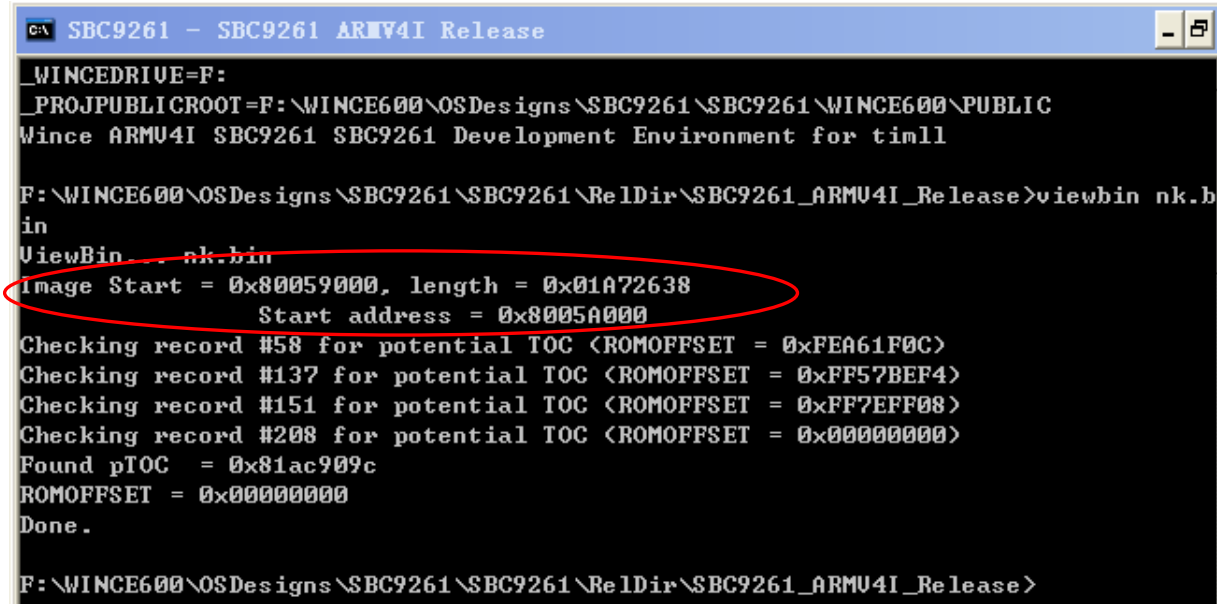

SBC9261 - SBC9261 ARMV4I Release
_WINCEDRIVE=F:
_PROJPUBLICROOT=F:\WINCE600\OSDesigns\SBC9261\SBC9261\WINCE600\PUBLIC
Wince ARMV4I SBC9261 SBC9261 Development Environment for timll
F:\WINCE600\OSDesigns\SBC9261\SBC9261\RelDir\SBC9261_ARMV4I_Release>viewbin nk.b
in
ViewBin... nk.bin
Image Start = 0x80059000, length = 0x01A72638
Start address = 0x8005A000
Checking record #58 for potential TOC (ROMOFFSET = 0xFEA61F0C)
Checking record #137 for potential TOC (ROMOFFSET = 0xFF57BEF4)
Checking record #151 for potential TOC (ROMOFFSET = 0xFF7EFF08)
Checking record #208 for potential TOC (ROMOFFSET = 0x00000000)
Found pTOC = 0x81ac909c
ROMOFFSET = 0x00000000
Done.
F:\WINCE600\OSDesigns\SBC9261\SBC9261\RelDir\SBC9261_ARMV4I_Release>

Figure 13.7.2

Physical Start Address 即 Image Start

Starting ip 即 Starting address

Total ROM size 即 length

Please note that here we enter the maximum NK length 0x2800000 that EBOOT supports, say 40MB instead of specific 0x137B820.

Technical support and Warranty Service

Technical support service :

Embest provide one year free technical support service for all products Embest is selling. Technical support service covers:

- Embest embedded platform products software/hardware materials
- Assist customers compile and run the source code we offered
- Solve the problems accurate on embed software/hardware platform if user was following the instruction in the documentary we offered
- Judge if the product failure is existing

Special explanation, the situations listed below have NOT been included in the range of our free technical support service, Embest will handle the situation with discretion:

- Software/Hardware issues user met during the self-develop process
- Issues happened when users compile/run the embedded OS which was tailored by users themselves
- User's own application
- Problems happened during the modification of our software source code

Maintenance service clause:

1. The products, which was used properly, will take the warranty since the day of the sale:

   PCB: Provide 12 months free maintenance service

2. The situations listed below have NOT been included in the range of our free maintenance service, Embest will charge the service fee with discretion:

   A. Can't provide valid Proof-of-Purchase, the identification label was tour up or illegible, the identification label was altered or not accord with the actual products;
   B. Didn't follow the instruction of the manual in order to damage the product
   C. Due to the natural disasters (unexpected matters), or natural attrition of the components, or unexpected matters leads the defects of appearance/function;
   D. Due to the power supply, bump, leaking of the roof, pets, moist, impurities into the boards, all those reasons which lead the defects of appearance/function;
   E. User unauthorized weld or dismantle parts leads the product's bad condition, or let other people or institution which was not authorized by Embest to dismantle, repair, change the product leads the product bad connection or defects of appearance/function;
   F. User unauthorized install the software, system or incorrect configuration or computer virus leads the defects;
   G. Purchase the products through unauthorized channel;

H. Those commitment which was committed by other institutions should be responsible by the institutions, Embest has nothing to do with that；

3. During the warranty period, the deliver fee which delivery to Embest should be covered by user, Embest will pay for the return delivery fee to user when the product was repaired. If the warranty period is expired, all the deliver fees will be charged by users.

4. When the boards needs repair, please contact technical support department.

Note: Those products was returned without the permission of our technician, we will not take any responsibility for them.

Base notice to protect and maintenance LCD:

---

1. Do not use finger nails or hard sharp object to touch the surface of the LCD, otherwise user can't enjoy the above service

2. Embest recommend user to purchase a piece of special wiper to wipe the LCD after long time use , please avoid clean the surface with fingers or hands to leave fingerprint

3. Do not clean the surface of the screen with chemicals, otherwise user can not enjoy above service.

Value Added Services:

We will provided following value added services:

- Provided services of driver develop base on Embest embedded platform, like serial port, USB interface devices, LCD screen.
- Provided the services of control system transplant, BSP drivers develop, API software develop.
- Other value added services like power adapter, LCD parts.
- Other OEM/ODM services.
- Technically training.

Please connect Embest and get technical support:

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- Fax:+86-755-25616057

- Pre-Sale consultation:sales@timll.com
- After-Sale consultation:support@timll.com